ON SOME COCCIDAE (HOMOPTERA), CHIEFLY FROM AFRICA.

BY

G. DE LOTTO

Plant Protection Research Institute, Pretoria.

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SYNOPSIS

Fourteen species of soft scales are redescribed, including the black scale *Saissetia oleae* (Bernard, 1782), which according to the author's conclusion does not occur in Africa south of the Sahara. Six more African species are described as new. Records from new hosts and localities of a few old species are given. The new generic name of *Kilifia* is proposed for *Platycoccus* Takahashi, 1959 [*non* Stickney, 1934].

INTRODUCTION

Following the new taxonomic concepts introduced by the late Prof. G. F. Ferris, an interesting revival has occurred in the study of many groups of Coccoidea. However, the soft scale family Coccidae has received very little attention. Our knowledge of this family, in spite of including several species of prominent economic importance, is on the whole not better than it was twenty, fifty, or more years ago. The majority of the species cannot be properly recognized from the descriptions available because the few diagnostic characters used in the past are either unreliable or of minor taxonomic value. A re-examination of material identified on the basis of such characters may at times prove to include different species, as in the case of *Saissetia oleae* discussed in this paper. The present generic classification, too, is far from satisfactory. Of 120–130 genera so far erected, hardly a dozen, that is only one-tenth of the total, are sufficiently known for a critical study of their composition. Many of the remainder are still based on rather superficial features.

The prospects for a general revision of the family are rather remote. Types, where available, are often in such a condition as to be of little or no use at all, and supplementary specimens have to be discovered. Obviously this task is beyond the reach of any single worker.

In the present series of papers, chiefly concerned with the fauna of Africa south of the Sahara, genera and species are reviewed as adequate material comes to hand. The writer is fully aware of the inconvenience that this procedure implies, but the present state of the group does not permit alternative courses.

DESCRIPTIONS AND RECORDS OF SPECIES

AKERMES Cockerell, 1902

Akermes Cockerell, 1902: 89.

Type-species: *Akermes bruneri* Cockerell, 1902.

Very little is known on the morphology of the type-species of this genus, except that full grown females are globular and legs and antennae are wanting. According to Cockerell, the skin is marked with a polygonal reticulation as in *Eulecanium* and with "a number of large dark chitinous areas". Whether or not *andersoni* is actually congeneric with *bruneri* is uncertain. Eventually it may be transferred to the genus *Cribrolecanium* Green, 1921 (type-species: *C. formicarum* Green, 1921) into which it seems to fit adequately.

Akermes andersoni Newstead, 1917

(Text-fig. 1)

Akermes andersoni Newstead, 1917: 347.
Akermes andersoni Newstead; Hall, 1937: 122.

First described on specimens infesting orange leaves in Kabete, Nairobi, KENYA (Newstead, 1917) and later recorded by Hall (1937) as occurring on leaves of grapefruit in SOUTHERN RHODESIA.

Adult female "completely covered with a rather dense, dusky-white, mealy secretion, which also spreads over the surrounding portions of the food-plant, giving the infested leaves an almost uniform mealy appearance. Colour, on the removal of the secretion, rich dark piceous or very dark castaneous, shining; younger examples varying from reddish brown to dusky buff. Form irregular oval, asymmetrical, and more or less narrowed in front; sometimes broadly ovate or subcircular. Flat or very low convex with a faint median keel in the abdominal region; sides well within the margin, with a series of widely separated *truncate tubercles*; these structures vary in number and are often asymmetrical. Derm densely chitinised, more especially towards the margins, where innumerable minute, translucent, poreless 'cells' are present." (Newstead, *loc. cit.*).

The following redescription is based on a series of young adult specimens from East Africa as listed below. Mounted females broadly rounded behind and acutely tapering in front; or irregularly deltoides, due to their position on the leaves; mouth parts, antennae and legs often displaced from the median line of the body; length 2·1–3·3 mm. Dorsum with altogether seven —occasionally eight—large, rounded, heavily sclerotized cribriform plates, symmetrically

arranged on the submarginal area; close to the margin of the body are scattered 11 to 16 other cribriform plates much smaller in diameter. Dorsal setae small, but stout; pointed. Dorsal pores absent. Paraopercular pores* set in a loose elongate group of 6 to 17 in front of the anal opercula. Submarginal pores wanting. Anal opercula with posterior lateral margin remarkably longer than the anterior lateral one; outer angle pointed; each operculum carries a longish, finely pointed discal seta, and one long robust and two small slender apical ones; length 95–125μ; combined width 110–140μ. Marginal setae rather slender and finely pointed, somewhat variable in size, ranging from 44 to 58μ in length; 20 to 40 setae occur on the margin between the anterior and posterior stigmatic clefts. Stigmatic spines three, small, cylindrical; median 10 to 20μ in length; laterals about half as long. Multilocular pores not numerous around the genital opening and extending in irregular loose transverse rows on all preceding abdominal segments. Quinquelocular pores few and arranged in bands one pore wide. Tubular ducts entirely lacking. Legs reduced to a very small spur, each with a minute claw on the apex. Antennae rudimentary, obscurely divided in four or five—occasionally six—segments; apical segment with 5 or 6 digitiform setae; total length 100–150μ. Fold of the anal invagination with four setae altogether. Ventral submedian setae on the abdominal segments anterior to the genital opening absent.

KENYA: Nairobi, 14.ii.1951, on *Ficus verrucocarpa* Warb. (Moraceae) (*G. De Lotto*); 20.vi.1951, on *Ehretia silvatica* Guerke (Boraginaceae) (*G. De Lotto*); 2.vii.1941, on *Callistemon* sp. (Myrtaceae) (*R. H. Le Pelley*). Ruiru, 15.i.1957, on *Passiflora edulis* Linn. (Passifloraceae) (*D. J. McCrae*). Taveta, 15.x.1955, on *Citrus* sp. (Rutaceae) (*P. E. Wheatley*).

SOUTH AFRICA: Transvaal, Nelspruit, 18.ii.1964, on *Passiflora edulis* Linn., (*I. B. Kok*).

CEROPLASTES Gray, 1828

Ceroplastes Gray, 1828: 7.

Type-species: *Coccus janeirensis* Gray, 1828.

After the Linnean *Coccus*, *Ceroplastes* is the oldest of the genera of the coccoid family Coccidae. Originally introduced as a section of *Coccus*, it was raised to generic rank by Vigor (1829). Two species were initially referred to it: *Coccus* (*Ceroplastes*) *chilensis*, which according to Green (1899) was described on preadults of the older *Coccus cerifer* Anderson, 1791; and *C.* (*C.*) *janeirensis* which was fixed, apparently by Fernald (1903), as the type-species of the genus. Lindinger's designation (1937) of *chilensis* is entirely invalid.

Specimens of the type-species and types, paratypes or other material of nearly all species known from Africa south of the Sahara have been seen by the present writer. On the basis of the arrangement of the stigmatic spines, the species are here grouped in two genera: *Ceroplastes* and *Gascardia*. In the former are retained species in which the spines are disposed in a linear row on either side of the stigmatic clefts along the margin of the body; in the latter are placed those having the spines set in more or less compact transverse groups which extend on the dorsum. In species of *Ceroplastes* the wax test is divided in a series of plates well recognizable throughout

* These are the tubercle-like pores of authors.

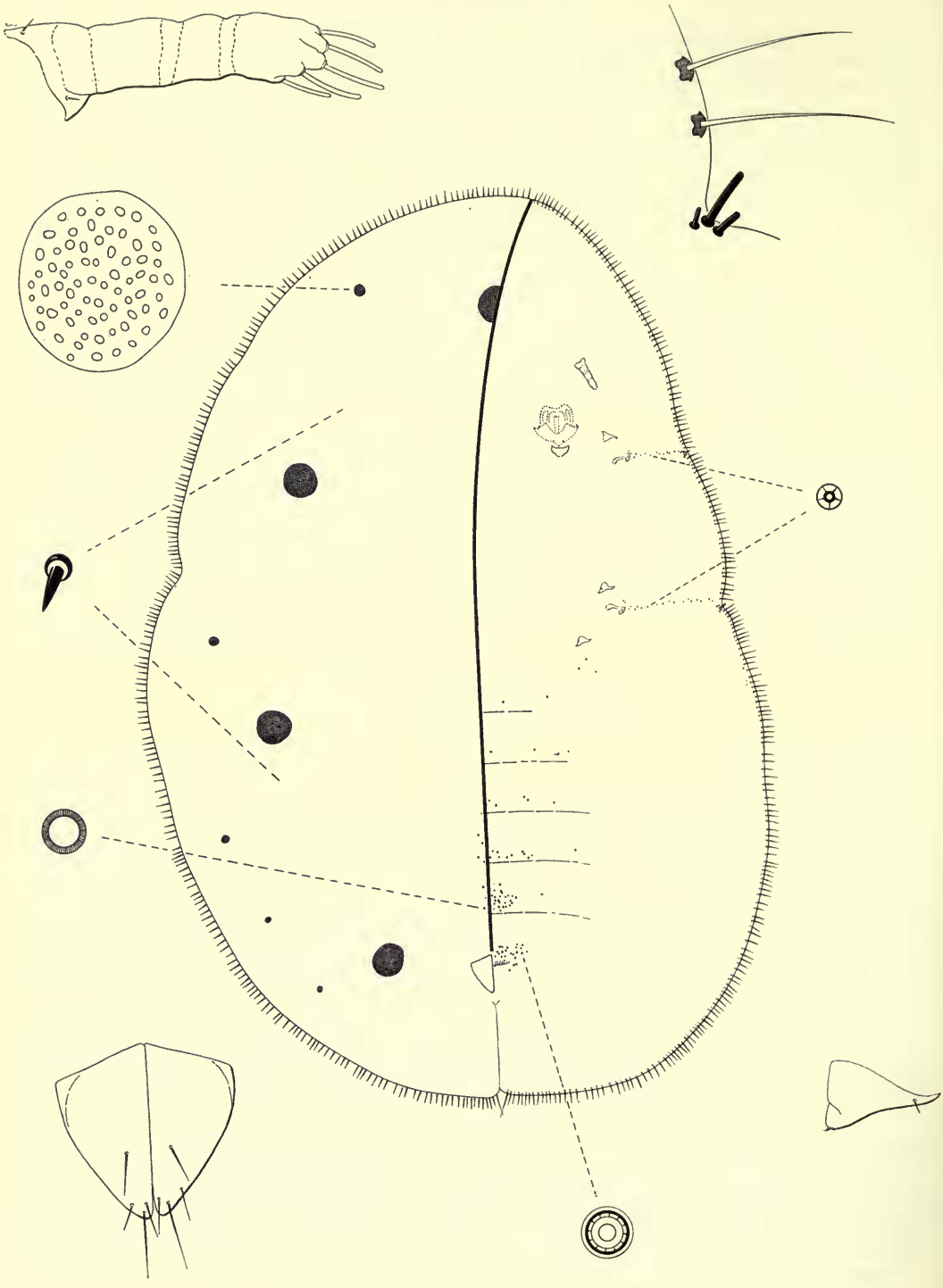

FIG. 1. *Akermes andersoni* Newstead.

the adult stage; while in those of *Gascardia*, a few days after the last moult, such division is not longer discernible and the covering assumes the aspect of a single solid mass of wax. In both instances there are however some exceptions.

The genus *Columnea* Targioni-Tozzetti, 1866 (type-species: *C. testudiniformis* Targioni-Tozzetti, 1866=*Coccus rusci* Linnaeus, 1758) is a subjective synonym of *Ceroplastes*. The genera *Ceroplastidia* Cockerell, 1910 (type-species: *Ceroplastes bruneri* Cockerell, 1902) and *Ceroplastina* Cockerell, 1910 (type-species: *Ceroplastes lahillei* Cockerell, 1910) are very likely subjective synonyms of *Gascardia*. Both were originally established as subgenera of *Ceroplastes* and were raised to generic rank by MacGillivray (1921). The nomenclatural status of *Coccicaccia* Amyot, 1847, a name formed by the union (and mis-spelling) of *Coccus cassiae* Chavannes, 1848, and *Coccopsidia* Amyot, 1847, for *Coccus psidii* Chavannes, 1848, is uncertain.

Nearly 150 species, varieties or subspecies of *Ceroplastes* are known up to present from the literature; the majority of them from tropical or subtropical countries. The following is an alphabetical list of the forms described or recorded from Africa south of the Sahara and their synonyms, with notes on their generic assignment.

africanus Green, 1899 . . . . . = *mimosae* Signoret, 1872.
africanus cristatus Green, 1899 . . . . = *egbarum* Cockerell, 1899.
africanus senegalensis Marchal, 1909 . . . = *mimosae* Signoret, 1872.
berliniae Hall, 1931 . . . . . referable to *Gascardia*.
berliniae enkeldoorni Hall, 1931 . . . . referable to *Gascardia*.
bipartitus Newstead, 1917 . . . . . transferred to *Gascardia*.
brevicauda Hall, 1931 . . . . . transferred to *Gascardia*.
= *destructor brevicauda* Hall, 1931
= *luteolus* De Lotto, 1955
bussei Newstead, 1906 . . . . . *nomen nudum*.
candela Cockerell, 1902. . . . . referable to *Gascardia*.
cerifer auctorum [*non* Anderson, 1791]* . . . = *destructor* Newstead, 1917.
combreti Brain, 1920 . . . . . referable to *Gascardia*.
coniformis Newstead, 1917 . . . . . referable to *Gascardia*.
deceptrix De Lotto, 1965 . . . . . here described as *Gascardia*.
destructor Newstead, 1917 . . . . . transferred to *Gascardia*.
= *cerifer* auctorum [*non* Anderson, 1791]*
destructor brevicauda Hall, 1931 . . . . = *brevicauda* Hall, 1931.
egbarum Cockerell, 1899 . . . . . referable to *Gascardia*.
= *africanus cristatus* Green, 1899
egbarum fulleri Cockerell, 1902 . . . . . referable to *Gascardia*.
egbarum rhodesiensis Hall, 1931 . . . . . referable to *Gascardia*.
erythraeus Leonardi, 1913 . . . . . referable to *Gascardia*.
eucleae Brain, 1920 . . . . . to be retained in *Ceroplastes*.
ficus Newstead, 1910 . . . . . retained in *Ceroplastes*.
= *pallidus* Brain, 1920
floridensis Comstock, 1881 . . . . . retained in *Ceroplastes*.
galeatus Newstead, 1911 . . . . . not seen.
helichrysi Hall, 1931 . . . . . referable to *Gascardia*.
helichrysi sinoiae Hall, 1931 . . . . . = *sinoiae* Hall, 1931.
lamborni Newstead, 1917 . . . . . not seen.

* This synonymy applies to East African records only.

longicauda Brain, 1920 . . . . . transferred to *Gascardia*.
longicauda sapii Hall, 1931 . . . . . referable to *Gascardia*.
luteolus De Lotto, 1955 . . . . . = *brevicauda* Hall, 1931.
mimosae Signoret, 1872 . . . . . referable to *Gascardia*.
= *africanus* Green, 1899
= *africanus senegalensis* Marchal, 1909
mimosae neghelii Bellio, 1939 . . . . . referable to *Gascardia*.
myricae (Linnaeus, 1767) . . . . . unrecognizable.
pallidus Brain, 1920 . . . . . = *ficus* Newstead, 1910.
personatus Newstead, 1898 . . . . . not seen.
quadrilineatus Newstead, 1910 . . . . . referable to *Gascardia*.
quadrilineatus royenae Hall, 1931 . . . . . referable to *Gascardia*.
quadrilineatus simplex Brain, 1920. . . . . = *simplex* Brain, 1920.
rubens Maskell, 1892 . . . . . retained in *Ceroplastes*.
rusci (Linnaeus, 1758) . . . . . to be retained in *Ceroplastes*.
rusci eugeniae Hall, 1931 . . . . . to be retained in *Ceroplastes*.
rusticus De Lotto, 1961 . . . . . transferred to *Gascardia*.
simplex Brain, 1920 . . . . . retained in *Ceroplastes*.
= *quadrilineatus simplex* Brain, 1920
singularis Newstead, 1910 . . . . . not seen.
sinoiae Hall, 1931 . . . . . transferred to *Gascardia*.
= *helichrysi sinoiae* Hall, 1931
spicatus Hall, 1937 . . . . . to be retained in *Ceroplastes*.
= *toddaliae spicatus* Hall, 1937
stellifer (Westwood, 1871) . . . type-species of *VINSONIA* Signoret, 1872.
stenocephalus De Lotto, 1961. . . . . transferred to *Gascardia*.
subdenudatus Newstead, 1917 . . . . . referable to *Gascardia*.
subsphaericus Newstead, 1911 . . . . . not seen.
tachardiaformis Brain, 1920 . . . . . referable to *Gascardia*.
theobromae Newstead, 1908 . . . . . not seen.
toddaliae Hall, 1931 . . . . . to be retained in *Ceroplastes*.
toddaliae spicatus Hall, 1937 . . . . . = *spicatus* Hall, 1937.
upacae Hall, 1931 . . . . . to be retained in *Ceroplastes*.
uapacae chrysophylli Hall, 1931 . . . . to be retained in *Ceroplastes*.
ugandae Newstead, 1911 . . . . . referable to *Gascardia*.
uvariae Marchal, 1911 . . . . . referable to *Gascardia*.
vinsonioides Newstead, 1911 . . . . . retained in *Ceroplastes*.
vuilleti Marchal, 1909 . . . . . referable to *Gascardia*.
zonatus Newstead, 1917 . . . . . referable to *Gascardia*.

In most wax scales, the study of the morphological structures is greatly hampered by large distortions of the integument, due in part to the high convexity of the body and in part to the presence of the caudal process. The strong sclerotization of this organ, moreover, obstructs the view of a wide area around the genital opening.

Besides the sclerotized caudal process, many species are provided with a series of dorsal and lateral membranous processes. Altogether eight are recognizable: one on the dorsum; one on the head; and three on either side of the body. These processes are normally pointed, except in *Ceroplastes ficus* and apparently in *C. simplex* in which they are broad, flat and somewhat dilated at the apex. Conversely in *Gascardia deceptrix*, *rustica* and *stenocephala*, and in *Ceroplastes floridensis*, *rubens* and *vinsonioides* they are obsolete.

Two kinds of dorsal pores, here designated pores of the simple or of the modified type, both having two to four loculi, occur in *Ceroplastes* and *Gascardia*. In pores of the simple type the loculi are oval, semicircular or triangular in shape and often of different size. In those of the modified type they are circular, all alike and always separated by a narrow, very elongate opening.

On either side of the ventral surface of the abdomen the body integument is deeply folded. This feature, called uro-ventral invagination, was found in all species of *Gascardia* and *Ceroplastes* examined so far.

The remaining morphological structures and the terms adopted for them do not need any particular mention, being common to all soft scales.

The following is a provisional key to the species from Africa south of the Sahara retained in *Ceroplastes* and dealt with in the following pages.

1		Dorsal pores of the modified type; tubular ducts with the inner duct greatly enlarged, and set in a band along the ventral submarginal area of the body	***floridensis***
		Dorsal pores of the simple type; tubular ducts with inner duct slender; when present the ducts are set in groupings on the fold of the uro-ventral invagination and on the cephalic area between the antennae only	2
2	(1)	Legs with a well developed tibio-tarsal articulatory sclerosis	3
		Tibio-tarsal articulatory sclerosis lacking	4
3	(2)	Dorsal setae cylindrical; ventral cephalic area with a group of tubular ducts between the antennae	***ficus***
		Dorsal setae stoutly spiniform and bluntly pointed; tubular ducts on the cephalic area wanting	***simplex***
4	(2)	Legs very small with tibia and tarsus fused together; stigmatic spines hemispherical	***rubens***
		Legs normal; stigmatic spines stoutly conical	***vinsonioides***

Ceroplastes ficus Newstead, 1910
(Text-fig. 2)

Ceroplastes ficus Newstead, 1910*a*: 190.
Ceroplastes ficus Newstead; Lindinger, 1913: 80.
Ceroplastes ficus Newstead; Newstead, 1917*b*: 128.
Ceroplastes pallidus Brain, 1920: 33.
Ceroplastes ficus Newstead; Hall, 1931: 294.

Newstead (1910*a*) first described *C. ficus* from TANGANYIKA on specimens collected on *Ficus* sp., and later (Newstead, 1917*b*) recorded it from SOUTH AFRICA on *Ochra pulchella** and from GHANA on *Annona* sp. The species was again described by Brain (1920) from SOUTH AFRICA under the name of *C. pallidus*. Hall (1931) after examining the types of both species came to the conclusion that they are identical, and sank the name of *pallidus* in synonymy with *ficus*. His views are here accepted.

"Test of the adult female more or less hemispherical, thin, semitransparent, hard and brittle, shaded with horn-coloured greys and browns; the large dorsal area comparatively smooth, with distinct lines radiating from the central nucleus, the larger ones being widely separated and

* Very likely a mis-spelling for *Ochna pulchra* Hook. (Ochnaceae).

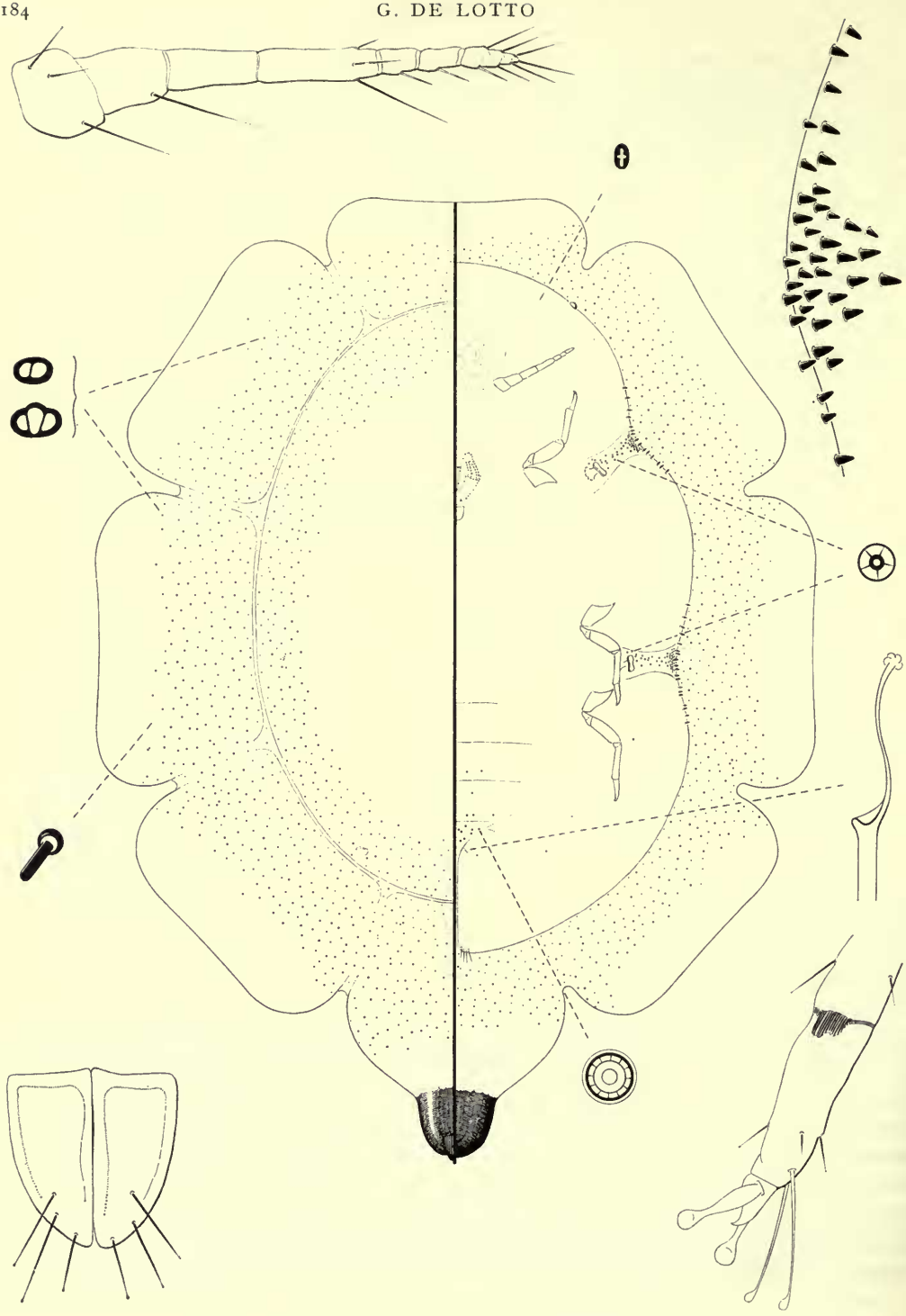

FIG. 2. *Ceroplastes ficus* Newstead.

equidistant. Besides these there are also some faint concentric ones visible in some of the examples. Lateral plates narrowly rectangular, length much greater than width, outer angles produced and darker than the rest; caudal process triangular, with the angle rounded; anal valves nude, minute, and only visible under a rather strong magnification. Length 6–6·5 mm.; width 5–5·25 mm." (Newstead, 1910*a*).

Mounted specimens 3–5 mm. long. Dorsal membranous process obsolete; cephalic and lateral ones very conspicuous, flat, broad and somewhat dilated at the apex, as shown in Text-figure 2. Dorsal setae very small, cylindrical. Dorsal pores of the simple type with two or three loculi. Setae and pores are lacking on the medio-dorsal area and on the apex of the membranous processes. Caudal process well developed, triangular but the sclerotization is reduced to a small area near the apex. Anal opercula 95–125μ long; each with three longish, robust setae. Stigmatic spines conical, not appreciably differentiated in size; each group is formed with 25 to 45 spines. Tubular ducts very few on the fold of the uro-ventral invagination and on the cephalic area between the antennae. Multilocular pores numerous around the genital opening; a few extend on the preceding abdominal segments. Quinquelocular and cruciform pores presenting nothing distinctive. Legs rather short otherwise normal, with a well developed tibio-tarsal articulatory sclerosis; ungual digitules attaining the same size and shape; dimensions of legs (iii): trochanter plus femur 180–205μ; tibia plus tarsus 195–210μ. Antennae with six or seven segments; total length 275–340μ.

UGANDA: Kampala, 9.vi.1958, on *Ficus* sp. (Moraceae) (*G. De Lotto*).

Ceroplastes floridensis Comstock, 1881

Ceroplastes floridensis Comstock; Green, 1916: 375.

Once only recorded from ZANZIBAR by Green (1916) on specimens living on *Citrus* sp.

The species is promptly separable from those from Africa south of the Sahara retained in the genus *Ceroplastes* by the presence of a ventral submarginal band of tubular ducts, all having the inner duct greatly enlarged. An excellent redescription and diagram of the species have been published by Ferris (1950).

As pointed out by Green (*in* Mamet, 1949), *C. floridensis* is very likely the same species which Signoret (1872) earlier described from MAURITIUS under the name of *C. vinsonii*.

Ceroplastes janeirensis (Gray, 1828)

(Text-fig. 3)

Coccus (*Ceroplastes*) *janeirensis* Gray, 1828: 7.
Ceroplastes janeirensis (Gray); Signoret, 1872: 42.
Ceroplastes janeirensis (Gray); Fernald, 1903: 153.

This species was very briefly described by Gray (1828) on specimens found on an unidentified *Solanum* in BRAZIL. The following redescription is based on three mounted young adult females ex Hempel's collection deposited in the British Museum (Natural History), London.

Mounted specimens 1·8–2·9 mm. long. Dorsal and cephalic membranous processes apparently obsolete; lateral ones poorly developed. Dorsal setae minute, cylindrical. Dorsal pores of the simple type with two loculi, among which are intermingled a few with three loculi. Setae and

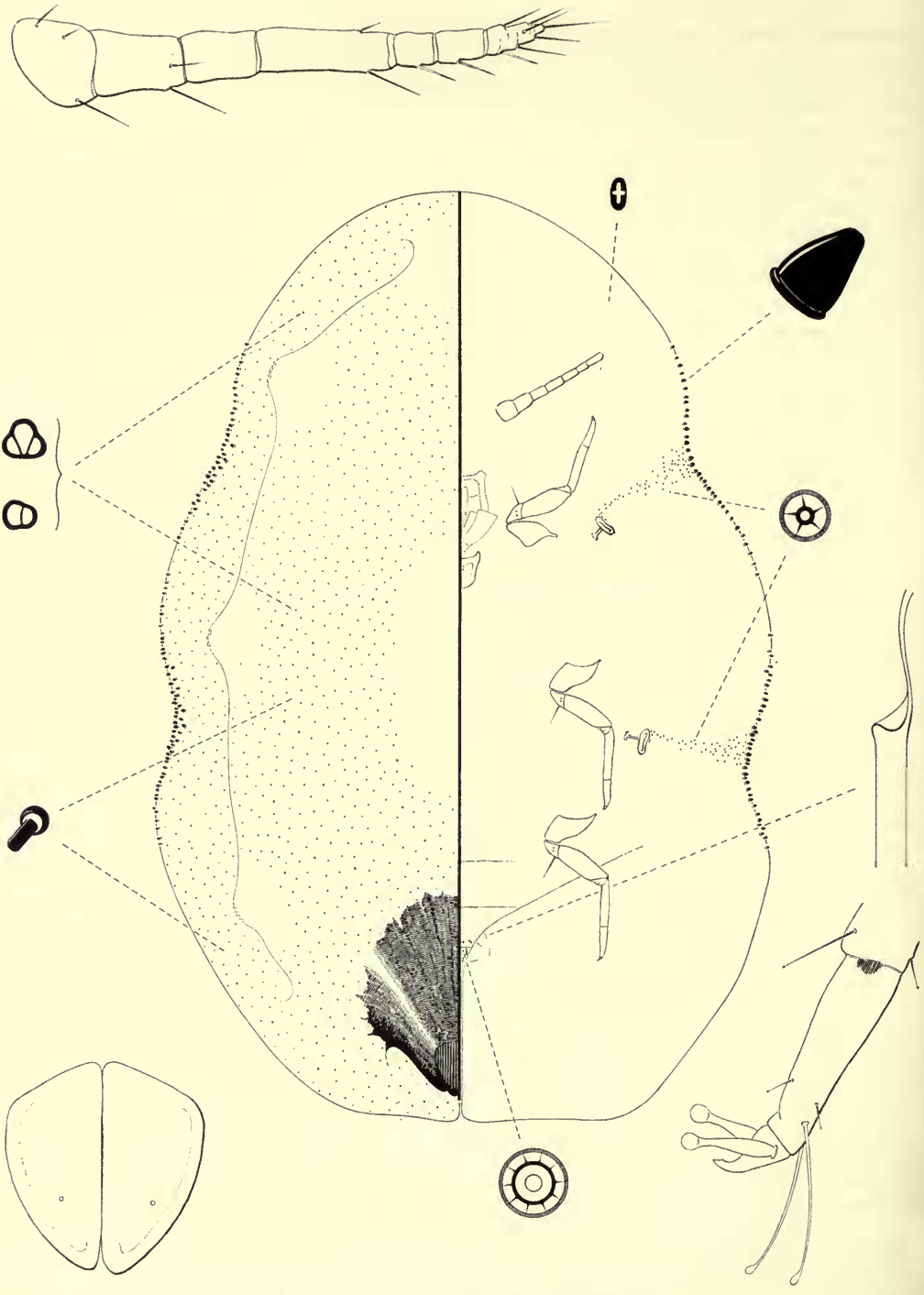

FIG. 3. *Ceroplastes janeirensis* (Gray)

pores are lacking on the central area of the dorsum and on the apex of the membranous processes. Caudal process short and stout, strongly sclerotized. Anal opercula 140–155μ long; combined width 110–145μ. The number and arrangement of the setae on each operculum could not be seen properly in the material examined, except for a seta socket occurring on the discal area. Stigmatic spines conical, at times truncate at the apex; variable in size and arranged in elongate rows, each of which is formed with 30–55 spines. Tubular ducts very few on the fold of the uro-ventral invagination only. Multilocular pores rather few on the last abdominal segments. Quinquelocular and cruciform pores as normal in the genus. Legs well developed with a tibio-tarsal articulatory sclerosis; ungual digitules not differentiated in size and shape, both stout and knobbed at the apex; claws with a small denticle; dimensions of legs (iii): trochanter plus femur 180–195μ; tibia plus tarsus 200–215μ. Antennae normally 7-segmented, total length 275–315μ. Eyes lacking.

BRAZIL: Ypiranga, collecting date and host plant not stated.

This species bears a close morphological resemblance to *C. rusci* (Linnaeus, 1758). The latter however differs from *janeirensis* in having a group of tubular ducts on the ventral cephalic area between the antennae; six segments to the antennae and in the absence of the denticle on the claws.

Ceroplastes rubens Maskell, 1893

Ceroplastes rubens Maskell; Newstead, 1917*b*: 129.

Previously known only from ZANZIBAR on *Citrus* sp. (Newstead, 1917*b*). The records listed below tend to indicate that, though not common, *C. rubens* is widely distributed along the eastern coast of Africa.

The material at hand agrees well with the redescription and diagram of the species presented by Ferris (*in* Zimmerman, 1948).

KENYA: Mombasa, 26.i.1960, on *Mangifera indica* Linn. (Anacardiaceae) (*G. De Lotto*).

SOUTH AFRICA: Natal, Durban, 15.x.1961, on *Phymatodes scolopendria* (Burm.) Chinq. (Polypodiaceae) (*W. Quednau*); 17.v.1961, on *Barringtonia racemosa* Roxb. (*D. P. Annecke*).

ZANZIBAR: 13.ii.1956, on *Cinnamomum* sp. (Lauraceae) (*R. H. Le Pelley*).

Ceroplastes simplex Brain, 1920 **stat. n.**

Ceroplastes quadrilineatus simplex Brain, 1920: 33.

Originally described by Brain (1920) as a variety of *C. quadrilineatus* Newstead, 1911, the insect is here raised to specific rank and retained in *Ceroplastes*. In *quadrilineatus* the stigmatic spines are arranged in fairly compact groups as typical of the genus *Gascardia* to which it should be transferred.

A redescription of *C. simplex* will be presented as soon as supplementary fresh material is available.

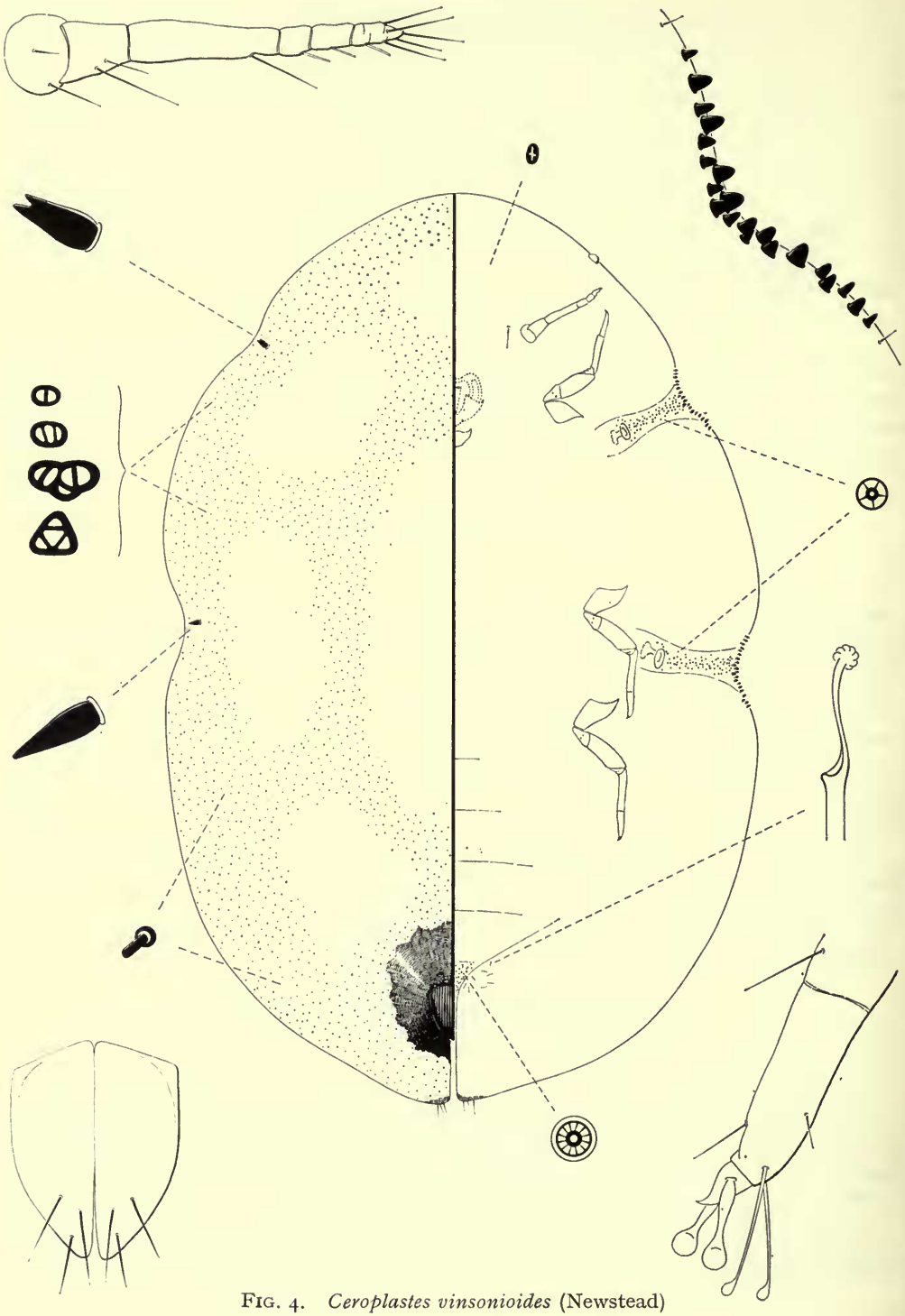

FIG. 4. *Ceroplastes vinsonioides* (Newstead)

Ceroplastes vinsonioides Newstead, 1911

(Text-fig. 4)

Ceroplastes vinsonioides Newstead, 1911*a*: 96.
Ceroplastes vinsonioides Newstead; Lindinger, 1913: 82.
Ceroplastes vinsonioides Newstead; Newstead, 1917: 129.

Originally described from UGANDA on specimens living on coffee. Known to occur in the same country on *Baikaea eminii* Taub. Lindinger's record from Tanganyika was also from coffee.

"Test of the adult female: dusky crimson, or brownish with faint tinge of dusky crimson; anterior margin sometimes paler (possibly pale crimson or pink when fresh); form rather broader than long; flattish above, with central nucleus; sides slightly recurved and projecting, and radiating from them are four short, thick, elevated arms; the anterior pair sometimes deeply concave dorsally, and all of them may be tipped with white wax. Test of young adult female: similar in colour to that of the older examples; flat, with central area slightly raised and nucleated; sides with four large and two small arms, the posterior pair shortest and tipped with greyish wax. . . . Length of old examples, 4–5 mm.; width, 5–6 mm.; height, 1–1·5 mm." (Newstead, 1911*a*). The following redescription is based on a series of newly collected specimens from Kenya as listed below. Mounted young adult females elliptical in outline, 1·4–2·5 mm. long. Medio-dorsal and lateral membranous processes not developed. Dorsal setae minute, cylindrical. Dorsal pores of the simple type with two to four loculi; often one or more pores are fused together, assuming an irregular shape and having up to five or six loculi. A large medio-dorsal area, one rounded or elongate area on the head and three on either side of the body are entirely devoid of setae and pores. Caudal process very short, heavily sclerotized. Anal opercula elongate, each of which is provided with two subdiscal and one subapical longish setae; length 145–160μ; combined width 110–125μ. Just in front of the anal opercula there is a transverse group of 10 to 20 small circular clear areas which very likely are homologous with the paraopercular pores of other soft scales. Stigmatic spines conical with the apex bluntly pointed, somewhat variable in size. On the dorsum, slightly displaced from the margin of the cleft, is inserted a large, isolated spine, often bidentate at the apex. Altogether 15 to 30 spines are associated with the anterior stigmatic clefts; and 20 to 25 with the posterior ones. Tubular ducts very few on the fold of the uro-ventral invagination only. Multilocular pores grouped around the genital opening and preceding abdominal segments. Quinquelocular and cruciform pores as usual in the genus. Legs normal, without tibio-tarsal articulatory sclerosis; ungual digitules not differentiated in shape and size; dimensions of legs (iii): trochanter plus femur 125–180μ; tibia plus tarsus 130–190μ. Antennae with six segments, measuring together 190–260μ.

KENYA: Nairobi, 7.i.1954, on *Strychnos* sp. (Loganiaceae) (*G. De Lotto*); 24.i.1956, on *Coffea arabica* Linn. (Rubiaceae) (*R. H. Le Pelley*).

COCCUS Linnaeus, 1758

Coccus Linnaeus, 1758: 455.
Calymmata O. Costa, 1828: 452.
Calypticus O. Costa, 1835: 8.
Lecanium Burmeister, 1835: 69.

Type-species: *Coccus hesperidum* Linnaeus, 1758.

As I have already pointed out (De Lotto, 1959) the composition of the genus *Coccus* is far from satisfactory. Many of the species still referred to it have little or no affinity at all with the type-species. However no attempt is here made to undertake a revision.

Altogether 28 species have been recorded or described so far from Africa, south of the Sahara. In the following provisional key the species are separated without any implication on their relationship.

1		Legs always present	2
		Legs entirely absent	***msasae***
2	(1)	Claws without denticle	3
		Claws with a small denticle	25
3	(2)	Dorsal setae cylindrical or slightly swollen apically	4
		Dorsal setae finely or bluntly pointed	11
4	(3)	Anal opercula very elongate, pyriform, with the anterior lateral margin about twice as long as the posterior lateral one	***mangiferae***
		Anal opercula roughly quadrate or, if elongate, with the anterior lateral margin somewhat shorter than the posterior lateral one	5
5	(4)	Dorsal setae of different size; ventral tubular ducts entirely absent	***acutissimus***
		Dorsal setae all attaining the same size; ventral tubular ducts, though at times strongly reduced in number, always present	6
6	(5)	Paraopercular pores numerous, large, nearly spherical, and set in a loose elongate group on the median and submedian dorsal areas as far as the head	***subacutus***
		Paraopercular pores, when present, small, flattish or conical and arranged in a small group in front of the anal opercula only	7
7	(6)	With a supplementary group of tubular ducts near the attachment of each antenna	***asiaticus***
		Without tubular ducts near the attachment of the antennae	8
8	(7)	With a few tubular ducts on either side of the genital opening only; tibio-tarsal articulatory sclerosis missing	***viridulus***
		With groupings of tubular ducts near the attachment of one or all legs; articulatory sclerosis well developed	9
9	(8)	Dorsum with a submarginal row of altogether 24–26 tubular ducts	***moestus***
		Tubular ducts on the dorsum entirely absent	10
10	(9)	Antennae with 8 segments; tubular ducts crowded near the attachment of all legs	***alpinus***
		Antennae 7-segmented; tubular ducts associated with middle and hind legs only	***viridis***
11	(3)	Anal opercula together oval, with lateral margins fused and forming a continuous curve	12
		Anal opercula roughly quadrate	13
12	(11)	Stigmatic clefts with 20 or more spines	***adersi***
		Stigmatic clefts with 3 spines only	***bicruciatus***
13	(11)	Ventral tubular ducts present	14
		Tubular ducts entirely lacking	20
14	(13)	Antennae with 8 segments	15
		Antennae with 7 segments	18

15 (14) Pale areas of the dorsal dermis large and close together near the margin and tending to be smaller and set rather widely apart near the centre of the body 16
Dorsal pale areas not differentiated in size and uniformly distributed ***aethiopicus***

16 (15) With a few ventral tubular ducts scattered on the marginal and submarginal area of the abdomen; multilocular pores crowded around the genital opening only . . . . . ***africanus***
Ventral tubular ducts set in a loose marginal and submarginal band all around the body; multilocular pores extending in transverse rows on all preceding abdominal segments 17

17 (16) With groupings of tubular ducts near the attachment of all legs and extending across the median area of the thorax . . . . . ***celatus***
Tubular ducts on the median area of the thorax and near the attachment of legs absent . . . . . ***consimilis***

18 (14) With a small group of tubular ducts about the genital opening only ***subhemisphaericus***
Tubular ducts set in groupings near the attachment of the legs and tending to extend across the median area of the thorax 19

19 (18) Legs with a tibio-tarsal articulatory sclerosis; marginal setae short and slender ***hesperidum***
Tibio-tarsal articulatory sclerosis absent; marginal setae fairly long and robust ***smaragdinus***

20 (13) Paraopercular pores arranged in an elongate group in front of the anal opercula 21
Paraopercular pores lacking . . . . . ***sordidus***

21 (20) Multilocular pores few about the genital opening and preceding abdominal segment 22
Multilocular pores extending in loose transverse rows on all preceding segments 23

22 (21) Marginal setae slender and finely pointed or slightly frayed at the apex . ***elongatus***
Marginal setae stout and slightly swollen apically . . ***pseudelongatus***

23 (21) Dorsum with numerous long setae arranged in three longitudinal fringes . ***oculatus***
Dorsal longitudinal fringes of setae absent 24

24 (23) Paraopercular pores in a group of 22–34 . . . . . ***rhodesiensis***
Paraopercular pores 3 to 9 altogether. . . . . ***ehretiae***

25 (2) Tibio-tarsal articulatory sclerosis absent; stigmatic clefts with 2 spines only . 22
Legs with a tibio-tarsal articulatory sclerosis; stigmatic clefts with 3 spines . 67

26 (25) Marginal setae small, spiniform; dorsum with a median longitudinal chitinized band extending as far as the head . . . . . ***durbanensis***
Marginal setae cylindrical; dorsal longitudinal chitinized band absent . ***proteae***

27 (25) Marginal setae slender, cylindrical . . . . . ***anneckei***
Marginal setae flattened and frayed at the apex . . . . . ***cajani***

Coccus aethiopicus De Lotto, 1959

Lecanium (*Coccus*) *viride* Green; Newstead, 1917*b*: 130 [misidentification].
Lecanium africanum Newstead; Brain, 1920: 4 [misidentification].
Coccus aethiopicus De Lotto, 1959: 156.
Coccus aethiopicus De Lotto; De Lotto, 1960: 401.

NORTHERN RHODESIA: Lusaka, 6.vi.1963, on *Coffea* sp. (Rubiaceae) (*C.J. Hodgson*).

Coccus alpinus De Lotto, 1960

Lecanium africanum Newstead; Newstead, 1917: 357 [misidentification].
Coccus africanus (Newstead) De Lotto, 1957*a*: 296 [misidentification].
Coccus alpinus De Lotto, 1960: 393.

Ethiopia: Harar, 19.xi.1961, on *Coffea* sp. (Rubiaceae) (*B. G. Hill*). Alemaya, 3.ii.1964, on *Carissa edulis* (Apocynaceae) (*B. G. Hill*).

Coccus elongatus (Signoret, 1874)

Lecanium elongatum Signoret; Newstead, 1911*a*: 92.
Lecanium acaciae Newstead, 1917: 355.
Lecanium elongatum Signoret; Brain, 1920: 5.
Lecanium wistariae Brain, 1920: 8. [*non* Signoret, 1874].
Lecanium kraunhiarum Lindinger, 1928: 107. [*n.n.*].
Lecanium elongatum Signoret; Hall, 1935: 74.
Coccus elongatus (Signoret) Strickland, 1947: 499.
Coccus elongatus (Signoret); De Lotto, 1957*a*: 301.
Parthenolecanium wistaricola Borchsenius, 1957: 349 [*n.n.*] **syn. n.**
Coccus elongatus (Signoret); De Lotto, 1959: 160.

To the list of synonyms of this species should be added *Parthenolecanium wistaricola*, a new name proposed by Borchsenius (1957) for *Lecanium wistariae* Brain, 1920 [*non* Signoret, 1874]. The species had already been re-named by Lindinger (1928) as *Lecanium kraunhiarum*.

Coccus hesperidum Linnaeus, 1758

Lecanium minimum pinicola Maskell, 1897: 310.
Lecanium hesperidum (Linnaeus); Newstead, 1906: 71.
Coccus hesperidum Linnaeus; Sanders, 1909: 436.
Lecanium hesperidum (Linnaeus); Newstead, 1910*a*: 187.
Lecanium hesperidum (Linnaeus); Newstead, 1911: 164.
Lecanium hesperidum (Linnaeus); Vayssière, 1913: 430.
Lecanium hesperidum (Linnaeus); Lindinger, 1913: 82.
Lecanium punctuliferum Green; Lindinger, 1913: 83.
Lecanium hesperidum (Linnaeus); Green, 1916: 375.
Lecanium (*Coccus*) *hesperidum* (Linnaeus); Newstead, 1917*b*: 130.
Lecanium hesperidum (Linnaeus); Brain, 1920: 3.
Lecanium (*Coccus*) *hesperidum* (Linnaeus); Ghesquière, 1927: 314.
Lecanium hesperidum (Linnaeus); Hall, 1935: 74.
Coccus hesperidum Linnaeus; De Lotto, 1959: 160.

Ethiopia: Alemaya, 17.viii.1960, on *Citrus* sp. (Rutaceae); 13.xi.1963, on *Carica papaya* Linn. (Passifloraceae); 18.xii.1963, on *Ceiba pentandra* (Linn.) Gaertn. (Bombacaceae); 1.iv.1964, on *Agave* sp. (Amaryllidaceae) (*B. G. Hill*).

Northern Rhodesia: Mazabuka, 21.vi.1963, on *Citrus* sp. (Rutaceae) (*C. J. Hodgson*).

Coccus smaragdinus sp. n.

(Text-fig. 5)

Fully mature adult females not seen. Young adult ones elongate, flattish; evenly light green in colour. Mounted specimens elliptical in outline, 1·8–2·8 mm. long. Dorsal dermis without areolate or reticulate pale areas; apparently its sclerotization begins from the margin and progressively extends towards the centre of the dorsum. Dorsal pores minute, circular, numerous. Dorsal setae slender, finely pointed; all attaining the same size and distributed without any pattern. Paraopercular pores flat, with a granulate surface, set in an elongate, loose group of 10–25 in front of the anal opercula. Submarginal pores 6–9 altogether. Anal opercula together roughly quadrate, with two or three small, slender apical setae; discal seta lacking; outer angle pointed; posterior lateral margin broadly rounded; length 117–124μ; combined width 124–139μ. Marginal setae robust, flattened and deeply frayed at the apex; length 29–44μ; 20 to 29 setae occur between the anterior and posterior stigmatic clefts. Stigmatic spines three; median 40–50μ; laterals 15–22μ. Multilocular pores few about the genital opening only. Quinquelocular pores set in bands one or two pores wide. Tubular ducts arranged in small groups near the attachment of all legs and extending across the median area of the meso- and metathorax. Legs well developed without tibio-tarsal articulatory sclerosis; ungual digitules not differentiated in form and size; dimensions of legs (iii): trochanter plus femur 146–161μ; tibia plus tarsus 153–182μ. Antennae 7-segmented with a pseudoarticulation on the fourth segment; total length 292–328μ. Fold of the anal invagination with altogether four setae.

KENYA: Nairobi, 18.i.1961, ♀ holotype and 11 ♀♀ paratypes collected on branches of *Strychnos* sp. (Loganiaceae) (*G. De Lotto*).—Coll. No. 2568.

The holotype and seven paratypes have been deposited in the British Museum (Natural History), London; and three paratypes in the U.S. National Collection of Coccoidea, Washington, D.C.

EUCALYMNATUS Cockerell, 1901

Eucalymnatus Cockerell, *in* Cockerell & Parrott, 1901: 57.

Type-species: *Lecanium tessellatum* Signoret, 1873.

This genus was originally introduced as a section of *Coccus*, and raised to generic rank by Cockerell himself (1902*a*). The conspicuous tessellated pattern of the dorsal derm is the main distinctive feature in which *Eucalymnatus* differs from *Coccus*. In all other characters the two genera are identical.

A redescription and a diagram of the type-species have been presented by Ferris (*in* Zimmerman, 1948).

Eucalymnatus tessellatus (Signoret, 1873)

Lecanium tessellatum Signoret; Lindinger, 1913: 83.
Eucalymnatus tessellatus (Signoret); Mamet, 1956: 136.

Previous records of this species are from TANGANYIKA (Lindinger, 1913) and from ZANZIBAR (Mamet, 1956). Its area of distribution in East Africa is apparently restricted to the coastal districts and offshore islands.

KENYA: Gazi, 24.ii.1951, on *Mangifera indica* Linn. (Anacardiaceae) (*R. H. Le Pelley*).

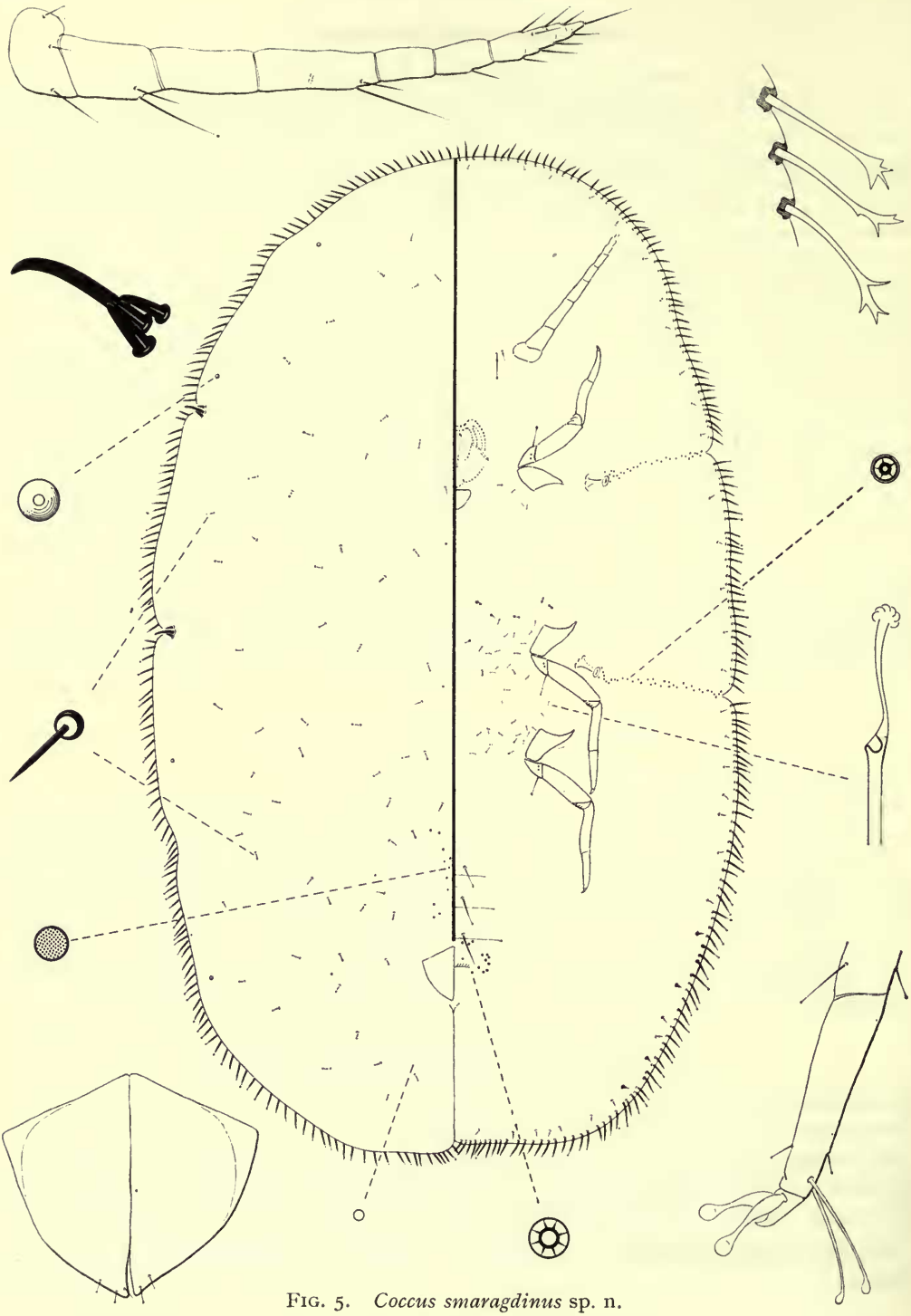

FIG. 5. *Coccus smaragdinus* sp. n.

GASCARDIA Targioni-Tozzetti, 1893

Gascardia Targioni-Tozzetti, *in* Gascard, 1893: 88.

Type-species: *Gascardia madagascariensis* Targioni-Tozzetti, 1893.

The monotypic genus *Gascardia* has nothing in common with the lac insects into which Targioni-Tozzetti originally placed it. As it has been pointed out by Newstead (1908), who presented a fairly detailed redescription of the type-species, the genus is morphologically related to *Ceroplastes*.

In the writer's opinion *Gascardia* is a good genus, to be used for the inclusion of those wax scales having the stigmatic spines set in more or less compact groups which extend from the stigmatic clefts towards the dorsum.

The species reviewed in the present paper can be separated by using the following provisional key:

1		Dorsal setae spiniform or conical	2
		Dorsal setae cylindrical	6
2	(1)	Legs with a tibio-tarsal articulatory sclerosis	3
		Tibio-tarsal articulatory sclerosis lacking	***rustica***
3	(2)	Medio-dorsal and lateral membranous processes not developed; ventral tubular ducts entirely absent	***stenocephala***
		Membranous processes well developed; tubular ducts set in groupings on the uro-ventral invagination and on the cephalic area between the antennae	4
4	(3)	Multilocular pores extending in transverse rows on all abdominal segments anterior to the genital opening	5
		Multilocular pores on the first abdominal segments lacking	***longicauda***
5	(4)	Caudal process short and conical; stigmatic spines set in groups of 15 to 25	***sinoiae***
		Caudal process rather long and nearly cylindrical in shape; stigmatic spines in groups of 60–80	***bipartita***
6	(1)	Dorsal pores of the simple type	***deceptrix***
		Dorsal pores of the modified type	7
7	(6)	Caudal process short	***brevicauda***
		Caudal process long and very stout	***destructor***

Gascardia bipartita (Newstead, 1917) comb. n.

(Text-fig. 6)

Ceroplastes bipartitus Newstead, 1917*a*: 25.
Ceroplastes bipartitus Newstead; Brain, 1920: 26.
Ceroplastes bipartitus Newstead; Hall, 1931: 293.

First described from South Africa from an unknown plant (Newstead, 1917*a*) and later recorded by Hall (1931) from Southern Rhodesia. Brain's record (1920) did not introduce any new information about the distribution of the species and its host plants. According to Hall, in the specimens from Southern Rhodesia the spines associated with the stigmatic clefts were fewer, and the caudal process longer than in Newstead's types.

"Female test. Colour, in dried specimens, very like pale dirty beeswax. In the young adults the test is broadly oval, somewhat hemispherical and divided into nine plates: three bilateral, one cephalic, one anal and one dorsal, the last-named with a conspicuous dark brown or blackish, oval spot, with a central elongate patch of pure white wax; the nuclear spots to the lateral plates are smaller and generally much less conspicuous than the dorsal one. Margin over the stigmatic areas with a pair of laterally compressed and somewhat disc-shaped extensions, each extension carrying *on its edge* a narrow strip of opaque white wax, the tip of which sometimes reaches the dark nuclear spot of the lateral thoracic plate. In very old examples the test has increased in thickness considerably, but this has been so much damaged in transit as to render it useless for descriptive purposes; however, one can trace the curious marginal extensions, which are somewhat like a narrow-waisted and distorted bobbin, or the toy in the once popular game "diabolo". Average length of young adults, 3 mm.; height, 1·6–2 mm.; average length of old adults, 6 mm.; height doubtful (Newstead, *loc. cit.*). The following redescription is based on three newly collected specimens which were compared with Newstead's paratypes, with which they agree well, except in that the stigmatic spines tend to be more numerous. Mounted specimens 3·5–4·2 mm. long. Medio-dorsal and lateral membranous processes fairly well developed. Dorsal setae very small, spiniform. Dorsal pores of the modified type with two or three loculi. Caudal process strongly sclerotized, subcylindrical, attaining about one fourth of the total length of the body. Anal opercula 145–160μ long; each with three longish but rather slender setae. Stigmatic spines somewhat variable in size, all conical and bluntly pointed at the apex; each stigmatic group is composed of 60 to 80 spines. Tubular ducts set in small groupings on the fold of the uro-ventral invagination and on the cephalic area between the antennae. Multilocular pores numerous around the genital opening and extending in loose transverse rows on all preceding abdominal segments. Quinquelocular and cruciform pores presenting nothing distinctive. Legs short, otherwise normal, with a well developed tibio-tarsal articulatory sclerosis; ungual digitules attaining the same size and shape; dimensions of legs (iii): trochanter plus femur 180–205μ; tibia plus tarsus 210–235μ. Antennae 6-segmented with a pseudoarticulation on the third segment; total length 370–395μ.

South Africa: Transvaal, Magoebaskloof, no date, on *Croton sylvaticus* Hochst. (Euphorbiaceae) (*J. H. Grobler*).

Gascardia brevicauda (Hall, 1931) **comb. n.**

(Text-fig. 7)

Ceroplastes destructor brevicauda Hall, 1931: 293.
Ceroplastes brevicauda Hall; De Lotto, 1955: 267.
Ceroplastes luteolus De Lotto, 1955: 268 **syn. n.**

This wax scale was briefly described by Hall (*loc. cit.*) as a variety of *Ceroplastes destructor* Newstead, 1917, on material collected in Southern Rhodesia on *Citrus aurantium* Linn., *Toddalia asiatica* Lam. (=*T. aculeata* Pers.) and *Cedrela toona* Roxbg. It has been raised to specific rank by the present writer (De Lotto, 1955). Under the name of *Ceroplastes luteolus* De Lotto, 1955, the species was again described from Kenya on specimens living on *Coffea arabica* Linn., *Citrus maxima* Merrill and *Markhamia platycalyx* (Baker) Sprague. A re-examination of the types of both species and the study of supplementary material from the same countries and other parts of Africa led to the conclusion that the small differences originally observed in *luteolus* come within the range of variation of *brevicauda* and do not warrant the recognition of a distinct species. The name of *luteolus* is therefore sunk as a synonym of *brevicauda*.

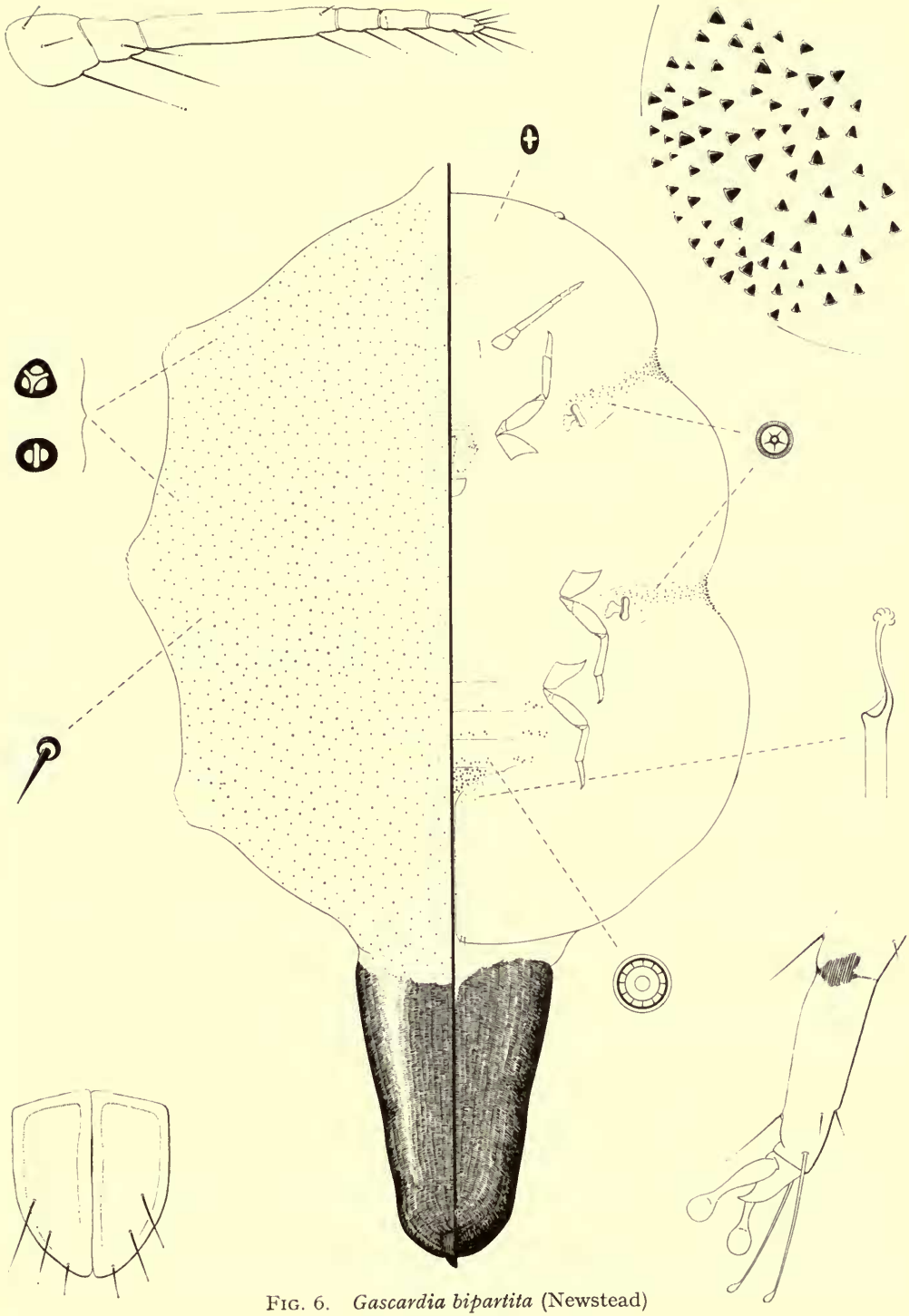

FIG. 6. *Gascardia bipartita* (Newstead)

Test of the living adult female at the beginning of the stage strongly convex, with a deep submarginal depression; test not divided in plates; centre of the dome with a minute elongate white boss; wax very soft; colour uniformly pure white to light creamy yellow, with four bands of opaque white wax arising from the stigmatic clefts. In old adults the submarginal depression is almost obliterated and the test is hemispherical or nearly so. Very young mounted adult females 1·7–2·5 mm. long. Dorsal setae minute, cylindrical. Dorsal pores of the modified type, with two or three small circular loculi. Both setae and pores are missing on the apex of the medio-dorsal and lateral membranous processes. Caudal process short, stout, strongly sclerotized. Anal opercula each with three robust subdiscal setae; length 140–160μ; combined width 120–135μ. Stigmatic spines conical, bluntly rounded at the apex and variable in size; 18 to 30 spines are associated with each anterior stigmatic cleft; 20 to 35 with the posterior ones. Tubular ducts set in a small group on the fold of the uro-ventral invagination. Multilocular pores numerous about the genital opening and last abdominal segments. Quinquelocular and cruciform pores presenting nothing distinctive. Legs short otherwise normal; tibio-tarsal articulatory sclerosis lacking; one of the ungual digitules stout, the opposite slender; both are knobbed at the apex; dimensions of legs (iii): trochanter plus femur 75–95μ; tibia plus tarsus 85–105μ. Antennae 6-segmented; total length 200–220μ.

Additional records of the species from Africa south of the Sahara, are:

Angola: Luanda*, on *Coffea stenophylla* Don. (Rubiaceae) (*A. P. da Fonseca*).

Eritrea: Asmara, on *Nerium oleander* Linn. (Apocynaceae) and *Schinus molle* Linn. (Anacardiaceae) (*G. De Lotto*). Material identified by Dr. W. J. Hall.

Kenya: Nairobi, on *Acokanthera longiflora* Stapf (Apocynaceae) (*G. De Lotto*). Ruiru, on *Citrus aurantium* Linn. (Rutaceae) and *Coffea arabica* Linn. (*T. J. Crowe*).

South Africa: Transvaal, Zebediela, 15.iv.1962, on *Citrus* sp. (*C. J. Cilliers*). Nelspruit, 1.x.1963, on *Citrus* sp. (*D. P. Annecke*).

Southern Rhodesia: Hatfield, on *Bidens pilosa* Linn. (Compositae) (*W. J. Hall*).

Uganda: South Bugishu, on *Coffea arabica* Linn. (*D. N. McNutt*). Kampala, on *Coffea robusta* Lindl. (*D. N. McNutt*).

The remarkable reduction in size of the caudal process and the smaller number of spines associated with the stigmatic clefts are the main characters by which *G. brevicauda* can be distinguished from the very closely allied *G. destructor* (Newstead, 1917).

The species seems to be widely distributed in Africa south of the Sahara. Reports received by the writer tend to indicate that in some areas the species may rank as a pest of some economic importance.

Gascardia cerifera (Anderson, 1791) **comb. n.**

Records of this species from Uganda and Tanganyika (Lindinger, 1907 and 1913; Newstead, 1910; 1910*a* and 1911) are to be understood as misidentifications of *G. destructor* (Newstead, 1917). Anderson's species does not occur in East Africa.

* Owing to an accidental oversight, the dates of collection of some records based on material studied and deposited at the Scott Agricultural Laboratories, Nairobi, cannot be supplied.

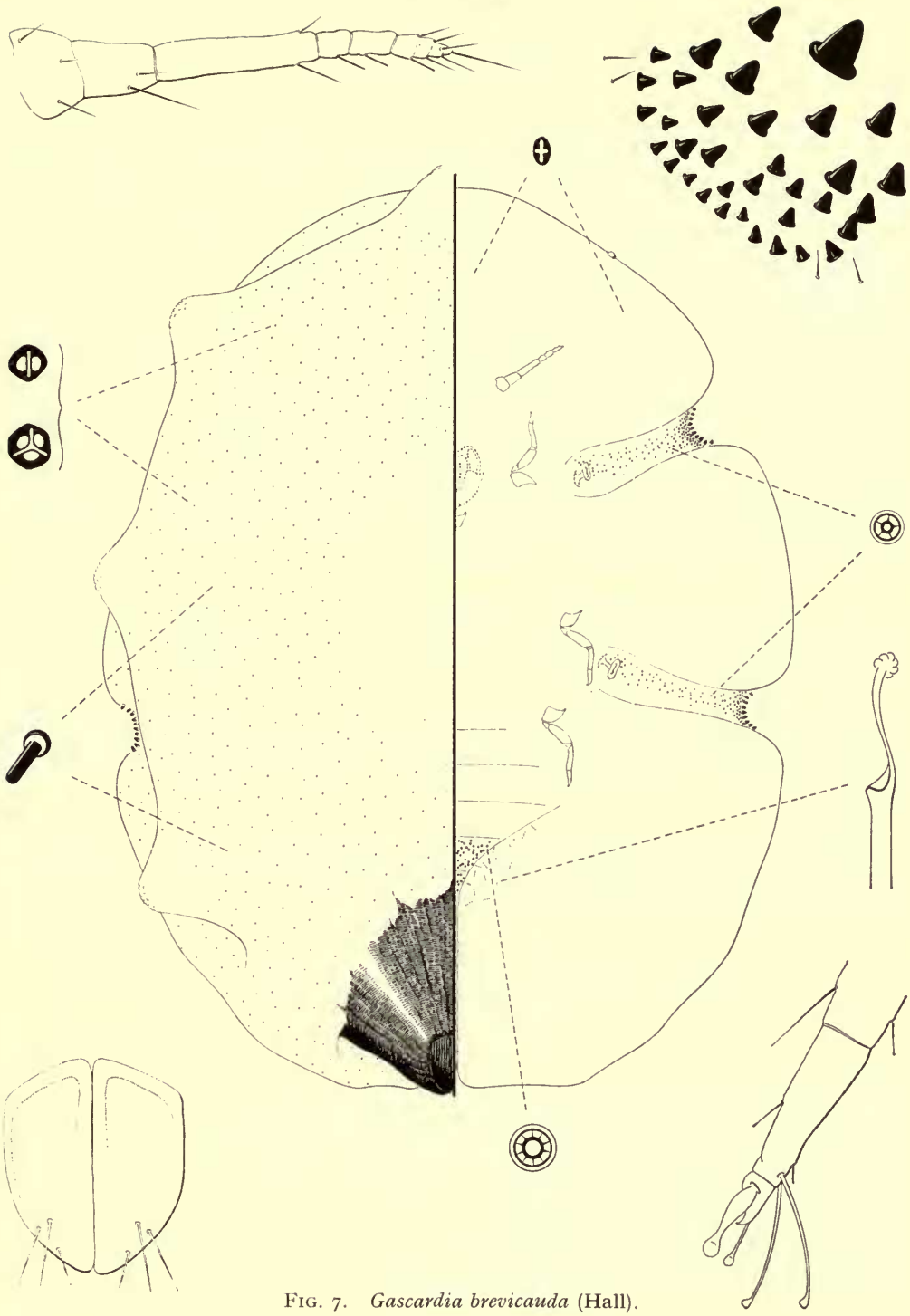

FIG. 7. *Gascardia brevicauda* (Hall).

Gascardia deceptrix sp. n.

(Text-fig. 8)

Young adult females moderately convex, elliptical, about 3 mm. long; wax test thin, fairly hard and brittle, not divided into plates; dorsum with a small depression at the centre of which is a minute elongate opaque white boss; colour semitransparent white; lateral margin with two narrow bands of snow-white wax arising from the stigmatic clefts. Full grown adult females not seen. Mounted young females broadly rounded behind and tapering in front; length 1·4–1·7 mm. Medio-dorsal and lateral membranous processes absent. Dorsal setae minute, cylindrical. Dorsal pores of the simple type with two to four loculi. Setae and pores are evenly scattered, except on the centre where they tend to be less numerous. Caudal process rather short and stout. Anal opercula each with three long, robust setae on the discal area, and a small slender one on the apex; length 125–140μ. Stigmatic spines stoutly conical and bluntly pointed; somewhat variable in size. Anterior groups formed by 35 to 50 spines; the posterior ones by 30 to 45. Few tubular ducts are scattered on the fold of the uro-ventral invagination and on the submarginal area of the meso- and, occasionally, metathorax; a group of ducts occurs on the cephalic area between the antennae. Multilocular pores numerous around the genital opening; a few pores are scattered on the preceding abdominal segments. Quinquelocular and cruciform pores presenting nothing distinctive in their arrangement. Legs normal, without tibio-tarsal articulatory sclerosis; ungual digitules not appreciably differentiated in shape and size; dimensions of legs (iii): trochanter plus femur 110–140μ; tibia plus tarsus 155–170μ. Antennae with six or seven segments; total length 225–255μ.

South Africa: Cape Province, Clanwilliam District, 17.v.1962, ♀ holotype and 4 ♀♀ paratypes collected on branches of *Rhus undulata* Jacq. (Anacardiaceae) (*J. Munting*).—Coll. No. 2792.

The holotype and one paratype have been deposited in the British Museum (Natural History), London; two paratypes in the South African National Collection of Insects, Pretoria; and one paratype in the U.S. National Collection of Coccoidea, Washington, D.C.

This species closely resembles *G. rustica* (De Lotto, 1961) but differs in having the dorsal pores of the simple type, the dorsal setae cylindrical, and in the absence of tubular ducts in the midregion of the abdomen.

Gascardia destructor (Newstead, 1917) comb. n.

(Text-fig. 9)

Ceroplastes cerifer (Anderson); Lindinger, 1907: 359 [misidentification].
Ceroplastes ceriferus (Anderson); Newstead, 1910: 66 [misidentification].
Ceroplastes ? ceriferus (Anderson); Newstead, 1910*a*: 195 [misidentification].
Ceroplastes ceriferus (Anderson); Newstead, 1911: 167 [misidentification].
Ceroplastes cerifer (Anderson); Lindinger, 1913: 80 [misidentification].
Ceroplastes destructor Newstead, 1917*a*: 26.
Ceroplastes destructor Newstead; Brain, 1920: 28.
Ceroplastes destructor Newstead; Hall, 1931: 293.
Ceroplastes destructor Newstead; Strickland, 1947: 498.

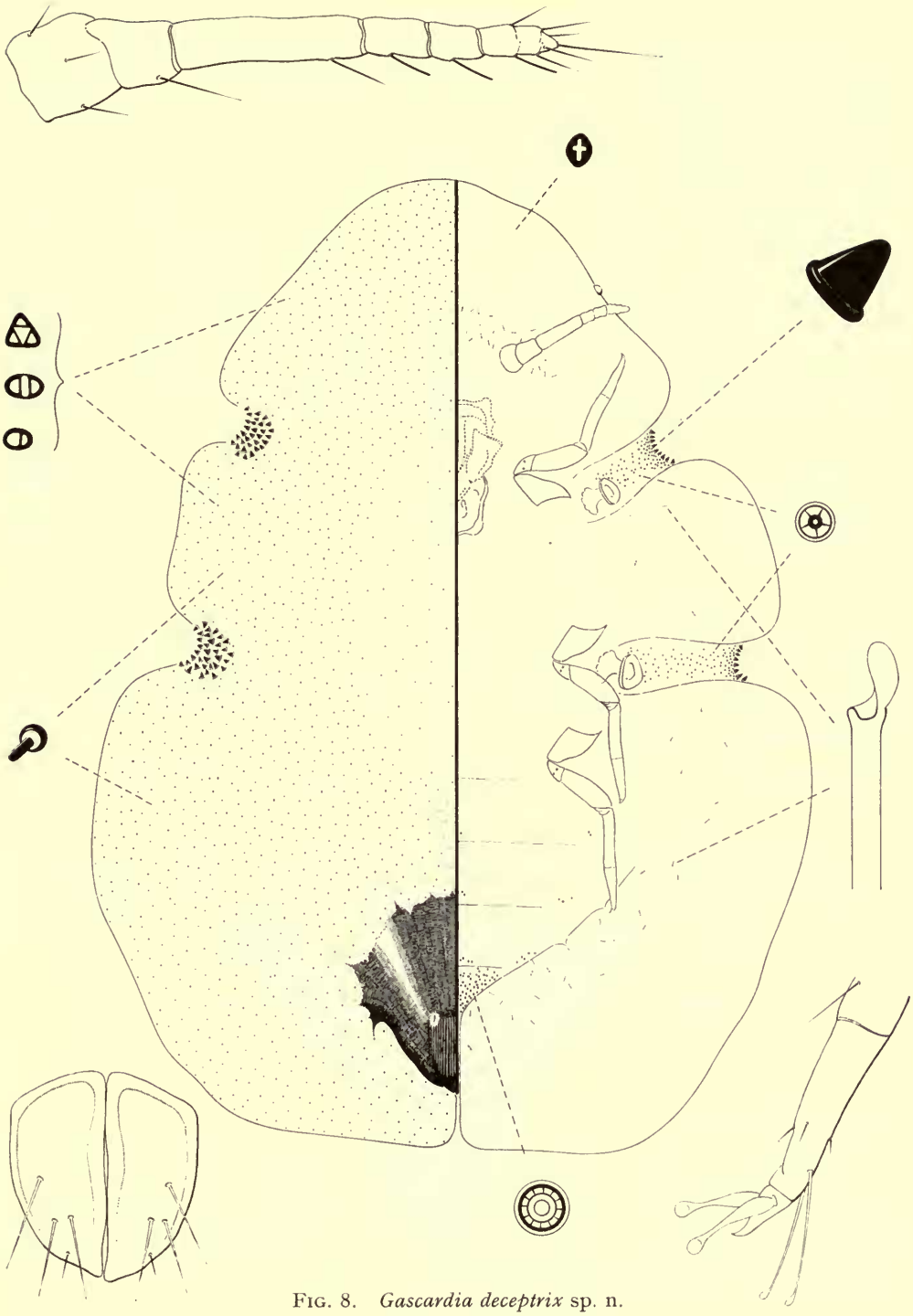

FIG. 8. *Gascardia deceptrix* sp. n.

"Female test white, creamy white or dirty white; exceedingly soft and containing an excess of moisture. Form irregular, with large but ill-defined gibbose protuberances; sides normally with two narrow opaque lines of secretion from the stigmatic clefts. No trace of lateral plates. Length 5–8 mm." (Newstead, 1917*a*). Young mounted adult females 3–5 mm. long. Dorsal setae very small, cylindrical. Dorsal pores of the modified type with two or three small circular loculi. Setae and pores are missing on the apical area of the medio-dorsal and lateral membranous processes. Caudal process fairly long, attaining about one-third of the total length of the insect; very stout and strongly chitinized. Anal opercula 130–170μ long; each bearing three longish, robust setae. Stigmatic spines conical, bluntly rounded at the apex, not appreciably differentiated in size, except one, normally the most external in position, which is about twice as large as the remaining spines; 35 to 85 spines are associated with the anterior stigmatic clefts; 40 to 90 with the posterior ones. Tubular ducts not numerous and set in an irregular group on the fold of the uro-ventral invagination. Multilocular pores very abundant about the genital opening and last abdominal segments. Quinquelocular and cruciform pores as normal. Legs short, without tibio-tarsal articulatory sclerosis; one of the ungual digitules slender; the opposite stout; both knobbed at the apex; dimensions of legs (iii): trochanter plus femur 80–100μ; tibia plus tarsus 85–110μ. Antennae with six segments; total length 195–250μ.

Congo: Rutshuru, 15.ii.1958, on *Coffea arabica* Linn. (Rubiaceae) (*D. J. McCrae*).

Kenya: Nairobi, 12.viii.1953, on *Gymnosporia* sp. (Celastraceae) (*G. De Lotto*). Kisii, 20.v.1954, on *Citrus* sp. (Rutaceae) (*T. J. Crowe*).

Mozambique: Vila Pery, March 1962, on *Citrus maxima* Merrill (*D. P. Annecke*).

South Africa: Cape Province, Grahamstown, March 1962, on *Citrus* sp. (*D. P. Annecke*). Transvaal, Naboomspruit, 19.x.1961, on *Psidium guajava* Linn. (Myrtaceae) (*D. P. Annecke*). Buffelspoort, July 1962, on *Poncirus trifoliata* (Linn.) Raf. (Rutaceae) (*J. Munting*).

Uganda: Entebbe, 2.vii.1954, on *Coffea robusta* Lindl. (*W. R. Ingram*).

The close resemblance of the wax test of this species to that of *G. cerifera* very likely accounts for the misidentifications of earlier authors. In slide mountings the two species may easily be distinguished from the shape of the caudal process, which in *cerifera* is very slender, nearly cylindrical, while in *destructor* it is stoutly conical.

Gascardia longicauda (Brain, 1920) comb. n.

(Text-fig. 10)

Ceroplastes longicauda Brain, 1920: 31.

"Adult female covered with a very thick layer of soft, white wax forming a test like a large *ceriferus* specimen, i.e., a little more elevated than *egbarum*. Largest specimen seen measured 18 mm. long, 11 mm. wide and 12 mm. high; marginal area prominent, forming a wide fold at the base of the central dome. The waxy appendages from the stigmatic clefts only project slightly from the main mass of the fold." (Brain, *loc. cit.*). In young living specimens observed in Kenya the wax covering was whitish with the dome suffused by a light mauve tinge, which turned to white or dirty white at full maturity.

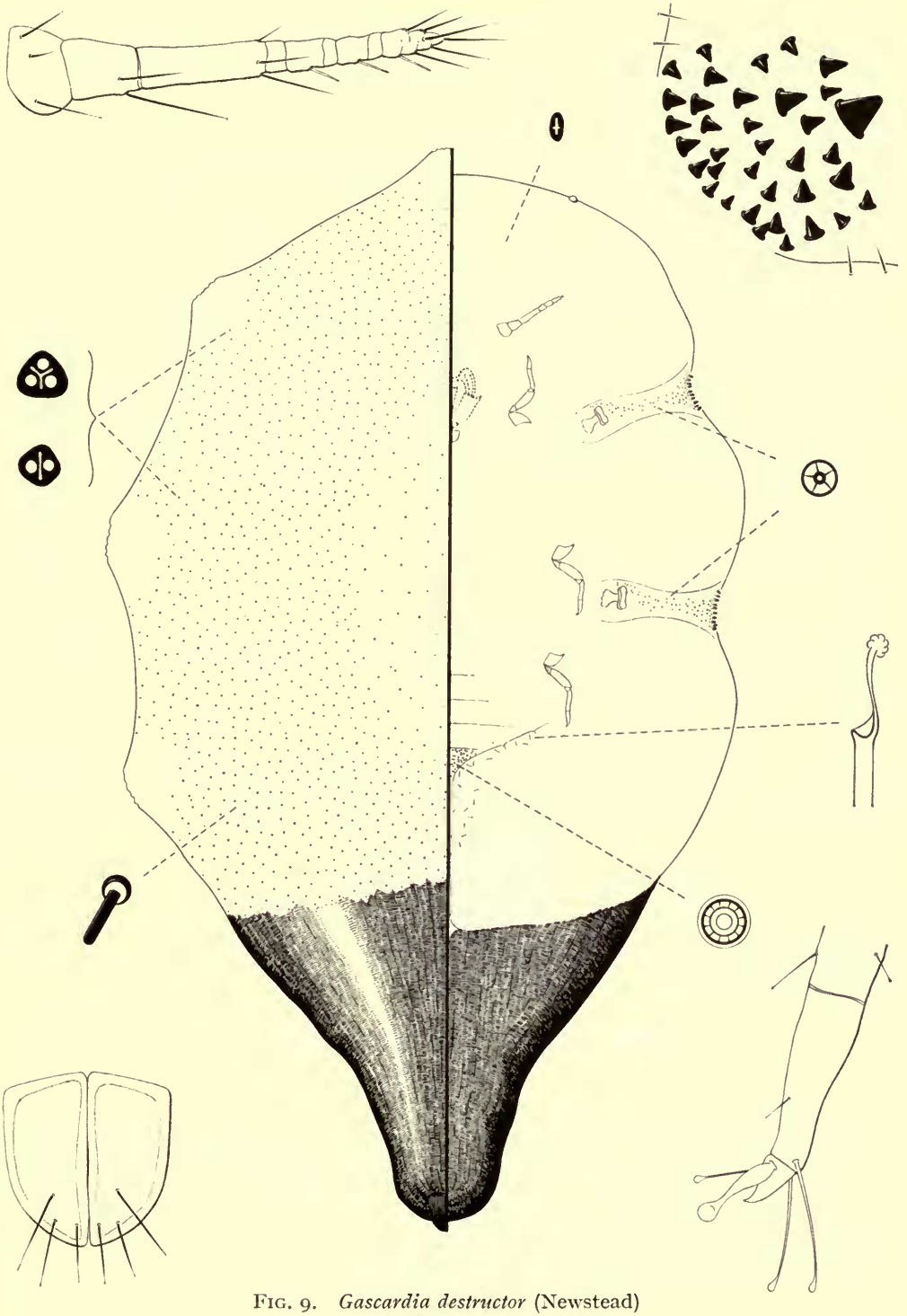

FIG. 9. *Gascardia destructor* (Newstead)

The following redescription is based on three paratypes deposited in the South African National Collection of Insects, Pretoria, and on a series of young mounted specimens from Kenya as listed below.

Mounted specimens 4·5–6·5 mm. long. Dorsal pores of the modified type, with two or three small circular loculi. Dorsal setae minute, spiniform and finely pointed. Setae and pores are distributed all over the dorsum, except on the apex of the medio-dorsal and lateral membranous processes, where they are entirely lacking. Caudal process very strongly sclerotized, slender and attaining about two thirds of the length of the body. Anal opercula 125–130μ long; each opercula is provided with one discal, one subdiscal and one apical seta; all robust and finely pointed. Stigmatic spines slightly variable in size, conical and bluntly rounded apically; each group is built up with 35–55 spines. Tubular ducts set in a small group on the fold of the uro-ventral invagination; at times a few ducts occur on the median cephalic area just in front of the attachment of the antennae. Multilocular pores numerous about the genital opening and last abdominal segments. Quinquelocular and cruciform pores arranged as usual. Legs all short otherwise normal, with a well developed tibio-tarsal articulatory sclerosis; ungual digitules not differentiated in shape and size, both stout and knobbed at the apex; dimensions of legs (iii): trochanter plus femur 175–190μ; tibia plus tarsus 205–215μ. Antennae with six segments, with one or two pseudoarticulations on the third*; total length 255–335μ.

KENYA: Nairobi, 2.ix.1951 and 17.v.1954, on *Jacaranda mimosaefolia* D. Don (Bignoniaceae) (*G. De Lotto*).

SOUTH AFRICA: Natal coast, July 1915, on stems of a native shrub (*G. Fuller*).—Coll. No. C.K.B. 334 (type-series).

This species comes close to *Gascardia cerifera* (Anderson, 1791) but differs in having the dorsal setae spiniform and all legs with a well developed articulatory sclerosis between the tarsus and tibia. Furthermore in *longicauda* the caudal process is longer and stouter than in *cerifera*.

The var. *sapii* described by Hall (1931) from Southern Rhodesia on specimens collected on *Sapium* sp. (Euphorbiaceae) is strongly suspected to be identical with *longicauda*. However no final conclusion about its identity could be reached, owing to the very poor condition of the two paratypes seen.

Gascardia rustica (De Lotto, 1961) **comb. n.**

Ceroplastes rusticus De Lotto, 1961: 318.

SOUTH AFRICA: Cape Province, Grahamstown, 28.x.1961, on *Selago corymbosa* Linn. (Scrophulariaceae) (*D. P. Annecke*).

Gascardia sinoiae (Hall, 1931) **comb. n.**
(Text-fig. 11)

Ceroplastes helichrysi sinoiae Hall, 1931: 296.

Very briefly described by Hall (1931) as a variety of *Ceroplastes helichrysi* Hall, 1931, on specimens collected on *Ficus* sp. in SOUTHERN RHODESIA. The morphological differences between the two forms discussed below fully warrant, in my opinion, the erection of var. *sinoiae* to specific rank.

* In all specimens examined, including the three paratypes, none of the antennae was found with 7 or 8 segments, as stated by Brain in his original description.

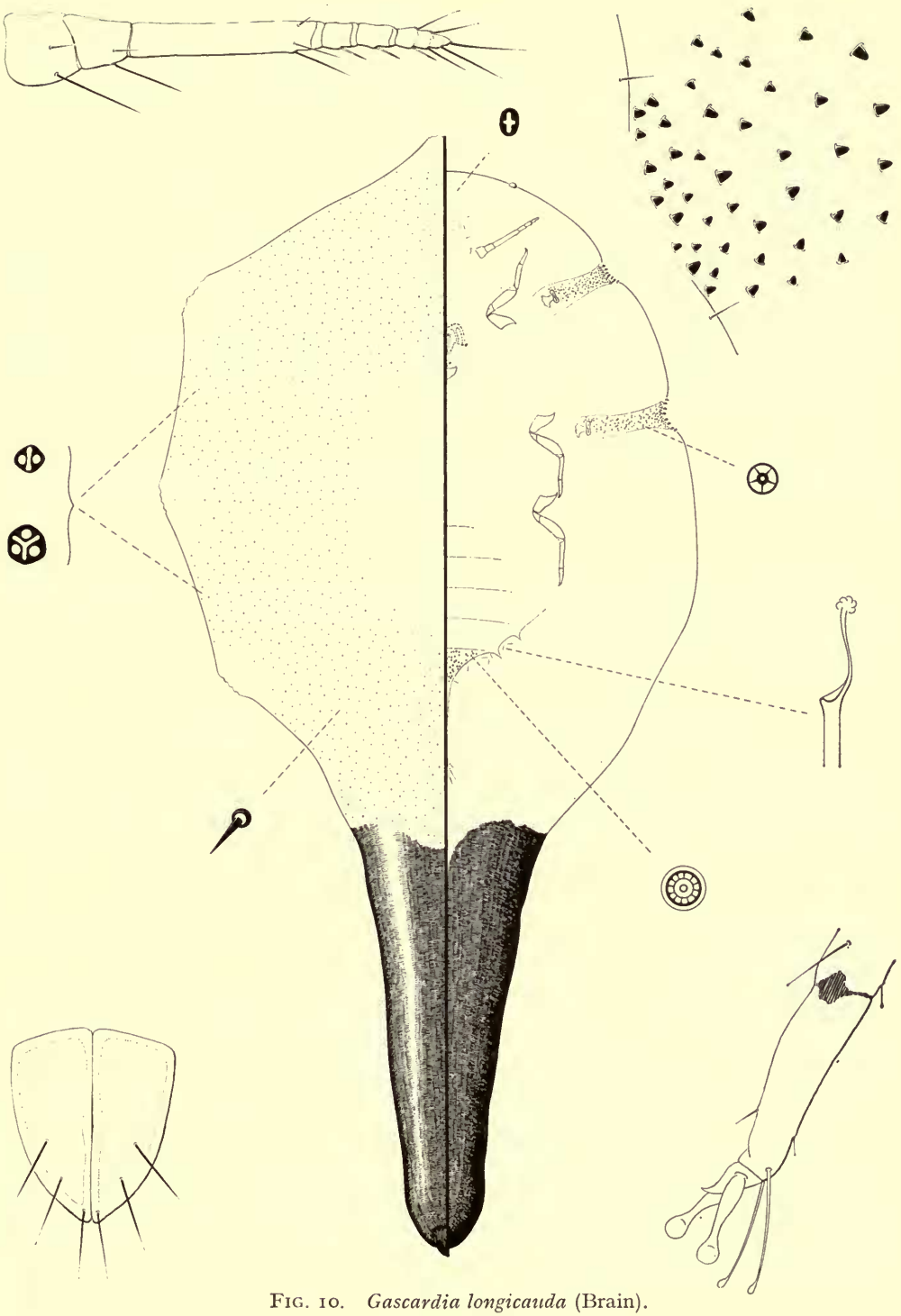

FIG. 10. *Gascardia longicauda* (Brain).

Test of full grown adult female hemispherical, not divided in plates, with a shallow medio-dorsal depression at the centre of which is situated a minute elongate boss; wax evenly white in colour; average dimensions: 8 mm. long; 8 mm. wide; 6 mm. high. Mounted young adult females 1·4–1·9 mm. Medio-dorsal and lateral membranous processes well developed. Dorsal setae small, conical, with tip bluntly pointed. Dorsal pores of the modified type, with two or three circular loculi. Both setae and pores are missing on the apical area of the membranous processes. Caudal process rather short, stout to very stout; strongly sclerotized. Anal opercula elongate, each with three longish, robust setae; length 145–155μ; combined width 120–130μ. Stigmatic spines slightly variable in size, all conical and rounded apically; 15 to 20 spines occur on the anterior stigmatic clefts; 20 to 25 on the posterior one. Tubular ducts set in small groups on the fold of the uro-ventral invagination and on the cephalic area between the attachment of the antennae. Multilocular pores numerous around the genital opening and extending in irregular transverse rows on all preceding abdominal segments. Quinquelocular and cruciform pores as normal. Legs well developed with a large tibio-tarsal articulatory sclerosis; ungual digitules not differentiated in shape and size; both stout and knobbed at the apex; dimensions of legs (iii): trochanter plus femur 220–225μ; tibia plus tarsus 215–230μ. Antennae with six segments; total length 285–325μ.

South Africa: Transvaal, Pretoria, 9.vii.1963, on *Jacaranda mimosaefolia* D. Don. (Bignoniaceae) (*E. C. G. Bedford*); 8.vii.1963, on *Ficus burkei* Miq. (Moraceae) (*E. G. G. Bedford*); 7.iv.1964, on *Hypericum revolutum* Vahl (Guttiferae) (*G. De Lotto*).

This species actually bears a close resemblance to *helichrysi*, but differs in that all legs are provided with a well developed tibio-tarsal articulatory sclerosis and the dorsal setae are stoutly spiniform. Furthermore, as indicated by Hall (1931), the ungual digitules are of equal size and shape.

Gascardia stenocephala (De Lotto, 1961) comb. n.

Ceroplastes stenocephalus De Lotto, 1961: 320.

In the diagram accompanying the original description of this species, the body structures on the ventral midregion of the abdomen are not clearly visible. A new diagram is presented in Text-fig. 12.

KILIFIA n. n.

Platycoccus Takahashi, 1959: 75 [*non* Stickney, 1934]

Type-species: *Lecanium acuminatum* Signoret, 1873.

The name *Platycoccus* was first made available in our nomenclature by Stickney (1934) for a genus of the diaspidid subfamily Phoenicococcinae. For Takahashi's genus *Platycoccus* the new name of *Kilifia* is here proposed.

In the writer's opinion the peculiar enlargement of the middle and hind legs and the shape of the anal opercula afford enough ground for the separation of *Kilifia* from *Coccus*. On the basis of the form of the anal opercula, Steinweden (1929) included *Lecanium acuminatum* in the genus *Protopulvinaria* Cockerell, 1894 (type-species: *Pulvinaria pyriformis* Cockerell, 1894). The latter however differs from *Kilifia* in having all legs normally developed and in the presence of a ventral sub-marginal band of tubular ducts.

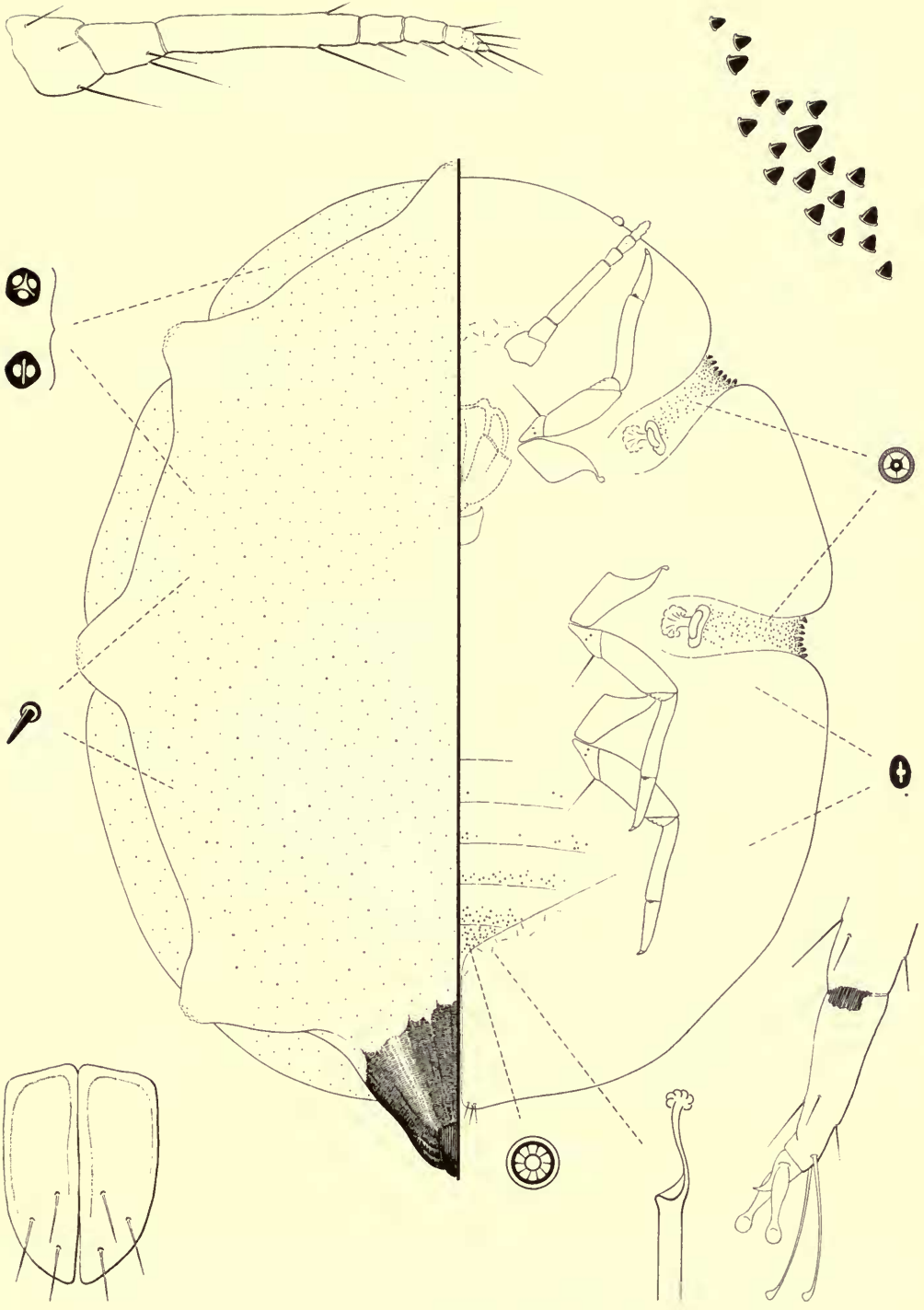

FIG. 11. *Gascardia sinoiae* (Hall).

Besides the type-species and *K. deltoides* here described as new, the genus *Kilifia* should include *Coccus diversipes* Cockerell, 1905, from the Philippine Islands. The following key to the species has been tentatively constructed from characters of *acuminata* and *diversipes* discussed by Ferris (*in:* Zimmerman, 1948).

1 Dorsum with a band of small 8-shaped pores extending as far as the head ***diversipes***

Dorsal median band of 8-shaped pores lacking; paraopercular pores, if present, set in small group in front of the anal opercula only 2

2 (1) Tibia of middle and hind legs with a well developed spur-like membranous process . . . . . ***deltoides***

Spur-like process on middle and hind tibiae lacking . . . . ***acuminata***

According to Williams (1963) *Lecanium wardi* Newstead, 1917, which Ferris (*loc. cit.*) considered closely related to *K. acuminata*, is a synonym of *Coccus mangiferae* (Green, 1889).

Kilifia acuminata (Signoret, 1873) **comb. n.**

Lecanium acuminatum Signoret, 1873: 397.
Lecanium acuminatum Signoret; Atkinson, 1889: 8.
Lecanium acuminatum Signoret; Maskell, 1893: 219.
Lecanium acuminatum Signoret; Green, 1904: 195.
Protopulvinaria acuminata (Signoret) Steinweden, 1929: 223.
Coccus hesperidum Linnaeus; Lindinger, 1935: 138.
Coccus acuminatus (Signoret); Ferris, *in* Zimmerman, 1948: 294.
Platycoccus acuminatus (Signoret); Takahashi, 1959: 76.

There is strong evidence that the species currently referred to under this name is not that actually described by Signoret as *Lecanium acuminatum* from orchids in greenhouses in Luxemburg. Signoret, who to a large extent based the diagnoses of the several species of *Lecanium* dealt with by him on the form and segmentation of legs and antennae, said nothing about the unusual development of the middle and hind legs so peculiar in this species. In a small diagram showing the ventral view of the adult female he presented on plate xi, fig. 1, all legs look subequal.

Identifications of *L. acuminatum* by later authors from the Hawaiian Islands (Maskell, 1893) and Ceylon (Atkinson, 1889; Green, 1904) merely rested on the outline of the body and shortness of the tarsi.

Without giving any reason for doing so, Lindinger (1935) sank Signoret's species in synonymy with *C. hesperidum* Linnaeus, 1758. His action can hardly be confuted because the types do not exist any longer.

Kilifia deltoides **sp. n.**

(Text-fig. 13)

Young living adults flat, emerald-green in colour, with some black or very dark brown minute dots set in irregular radiating rows near the margin of the body; old adults flattish, colour evenly dark brown. Mounted specimens broadly oval in outline, often asymmetric, 1–2 mm. long. Chitinization of the dorsal dermis apparently uniform. Dorsal pores small, elliptical, with two

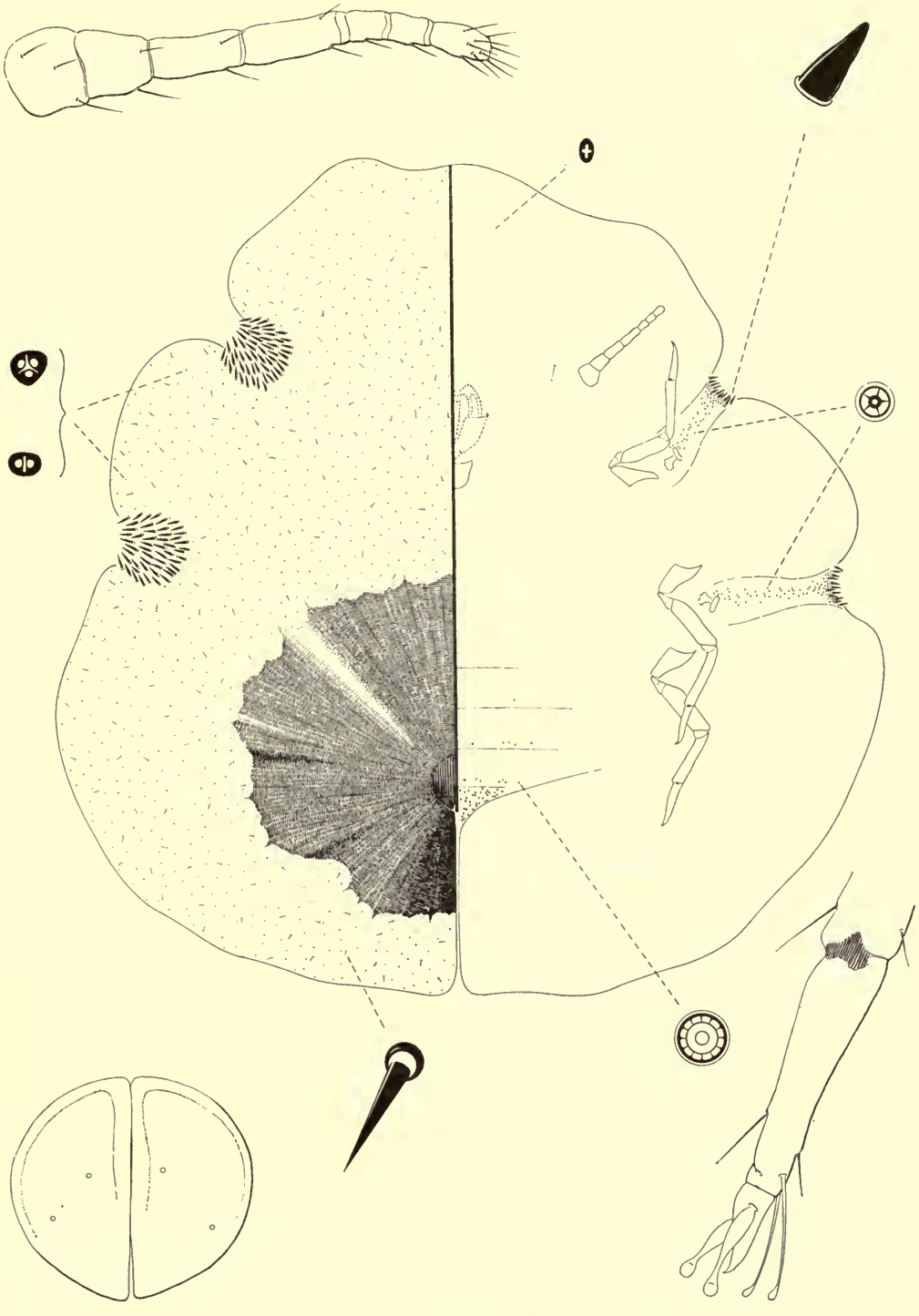

FIG. 12. *Gascardia stenocephala* (De Lotto)

loculi. Dorsal setae small, cylindrical. Both pores and setae are arranged in a fairly regular reticulated pattern, except on the marginal and median areas where they are entirely lacking; among them are intermingled numerous minute simple pores. Paraopercular pores small, flat, with a granulate surface, set in an elongate group of 33–36 along the median area in front of the anal opercula. Submarginal pores 5 to 9 altogether. Anal opercula elongate; anterior and posterior lateral margins straight; each operculum bears one subapical and three apical small, slender setae; length 167–182μ; combined width 117–131μ. Marginal setae flattened and deeply branched at the apex, 14–18μ long; 23 to 31 setae occur between the anterior and posterior stigmatic clefts. Stigmatic spines three; median 13–16μ; laterals 4–5μ. Multilocular pores arranged in two small groups on the submedian area just caudad to the genital opening. Quinquelocular pores associated with the stigmatic openings set in bands one or two pores wide. Tubular ducts entirely lacking. Legs with a fairly well developed tibio-tarsal articulatory sclerosis; ungual digitules not differentiated in shape and size, both stout and apically knobbed; coxa, trochanter and femur of the middle and hind legs very large and with the distal end of the tibia provided with a well developed membranous spur; dimensions of legs (iii): trochanter plus femur 285–314μ; tibia plus tarsus 168–182μ. Antennae 7-segmented; at times reduced to six segments with a pseudoarticulation on the third; total length 241–256μ. Fold of the anal invagination with altogether four setae. Medio-ventral abdominal setae reduced to one couple on the segment anterior to the genital opening.

KENYA: Kilifi, 5.ii.1963, ♀ holotype and 7 ♀♀ paratypes collected on leaves of *Mangifera indica* Linn. (Anacardiaceae) (*G. De Lotto*).—Coll. No. 2793.

The holotype and four paratypes have been deposited in the British Museum (Natural History), London; three paratypes in the U.S. National Collection of Coccoidea, Washington, D.C.

Other records of the same species on material not included in the type series, are:

KENYA: Mombasa, 24.v.1951, on *Anacardium occidentale* Linn. (Anacardiaceae) (*R. H. Le Pelley*).

ZANZIBAR: 11.ii.1956, on *Eugenia* sp. (Myrtaceae) (*R. H. Le Pelley*).

MARSIPOCOCCUS Cockerell & Bueker, 1930

Marsipococcus Cockerell & Bueker, 1930: 7.

Type-species: *Lecanium marsupiale* Green, 1904.

Certainly a valid genus as far as its separation from *Coccus* is concerned. At present only the type-species is referred to it.

Marsipococcus marsupialis (Green, 1904)

(Text-fig. 14)

Lecanium marsupiale Green, 1904: 212.
Lecanium marsupiale Green; Lindinger, 1913: 82.

This species was first described from CEYLON (Green 1904) as living on the upper surface of leaves of *Piper nigrum* Linn. (Piperaceae) and on other species of pepper; on *Pothos scandens* Linn. (Araceae); and occasionally on *Annona* sp. (Annonaceae). According to Green it also occurs in southern India on cultivated pepper vines.

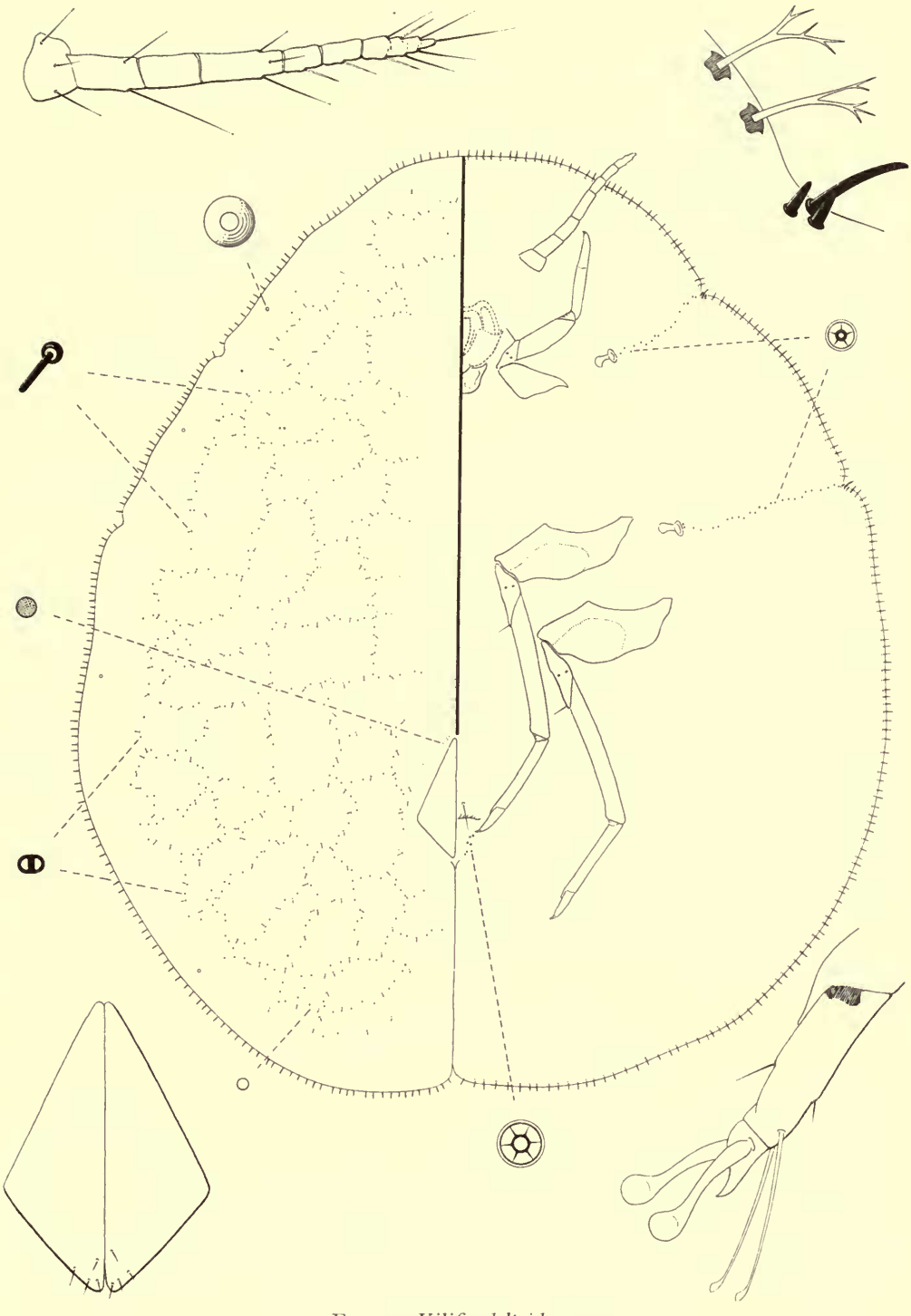

FIG. 13. *Kilifia deltoides* sp. n.

In 1913 Lindinger recorded the species from Amani, Tanganyika, on specimens found on the under surface of leaves of *Manihot glazioui* Muell. (Euphorbiaceae).

"Adult female very flat and broad; posterior half widest; extremities either rounded or bluntly pointed. Median area deep reddish brown, mottled with darker brown. A broad, greenish, marginal zone, sharply demarked from the median reddish area. Eyes minute, black, close to the inner edge of marginal zone. . . . Under surface with a deep pouch on each side of abdomen, in which the young larvae are sheltered for some time after birth. Limbs so closely pressed into surface of body as to be practically invisible on the living insects. . . . Length of well-grown example 9 mm. Breadth 6 to 6·5 mm. The early adult female, before gestation, is very thin and transparent, the median area mottled with pale reddish brown. When in position on the leaf, it is scarcely visible, except by its glistening surface. Delicate glassy filaments are secreted from the marginal hairs". (Green, 1904).

The following redescription is based on a single mounted specimen in fairly good condition, examined at the Department of Entomology, British Museum (Natural History), London.

Body elongate, rather acutely tapering at both ends; length 8 mm. Dorsal dermis membranous, plain. According to Green the dorsum is marked with "small scattered translucent pores, and some irregular nebulous pale streaks on the marginal area" not visible on the specimen examined. Dorsal pores very small, circular, with two loculi; not numerous and scattered. Dorsal setae minute, bluntly pointed. Paraopercular pores small, flat, very numerous and arranged in a fairly regular band along the median line of the body and extending as far as the head. Submarginal pores lacking. Anal opercula somewhat elongate, with outer angle broadly rounded and with two small apical setae; length 204μ; combined width 175μ. Dorsal dermis all around the opercula heavily sclerotized. Stigmatic clefts deep, conspicuous, with the inner edge dorsally marked with a densely sclerotized band, on either end of which is inserted a conical spine 29–35μ long; no spines or setae occur in the centre of the clefts. Setae of the marginal fringe stoutly spiniform, 30–46μ long; the number of setae occurring between the anterior and posterior stigmatic clefts is 43 in one side and 49 in the opposite one. Paragenital pores of the quinquelocular type, very few about the genital opening only. Quinquelocular pores associated with the stigmatic openings set in bands two pores wide. Tubular ducts few and crowded on the submedian area on either side of the genital opening. Legs short, otherwise normal; articulation between the tarsus and tibia very poorly marked; sclerosis lacking; ungual digitules very broadly swollen apically; dimensions of legs (iii): trochanter plus femur 350μ; tibia plus tarsus 314μ. Antennae with seven segments with a pseudoarticulation on the fourth; total length 452μ. The setae on the fold of the anal invagination could not be satisfactorily counted.

Ceylon: Peradeniya, January 1902, on *Piper nigrum* Linn. (Piperaceae) (*E. E. Green*).

PARASAISSETIA Takahashi, 1955

Parasaissetia Takahashi, 1955: 26.

Type-species: *Lecanium nigrum* Nietner, 1861.

The main characters used by Takahashi for differentiating his new genus from *Saissetia* were the slenderness of the tarsi and the absence of a free tibio-tarsal articulation; to which he added the polygonal pattern of sclerotization of the dorsal dermis. In his view, while the type-species of *Saissetia* is close to *Pulvinaria*, that of *Parasaissetia* has more affinity with *Lecanium* (=*Coccus*). In my opinion a more

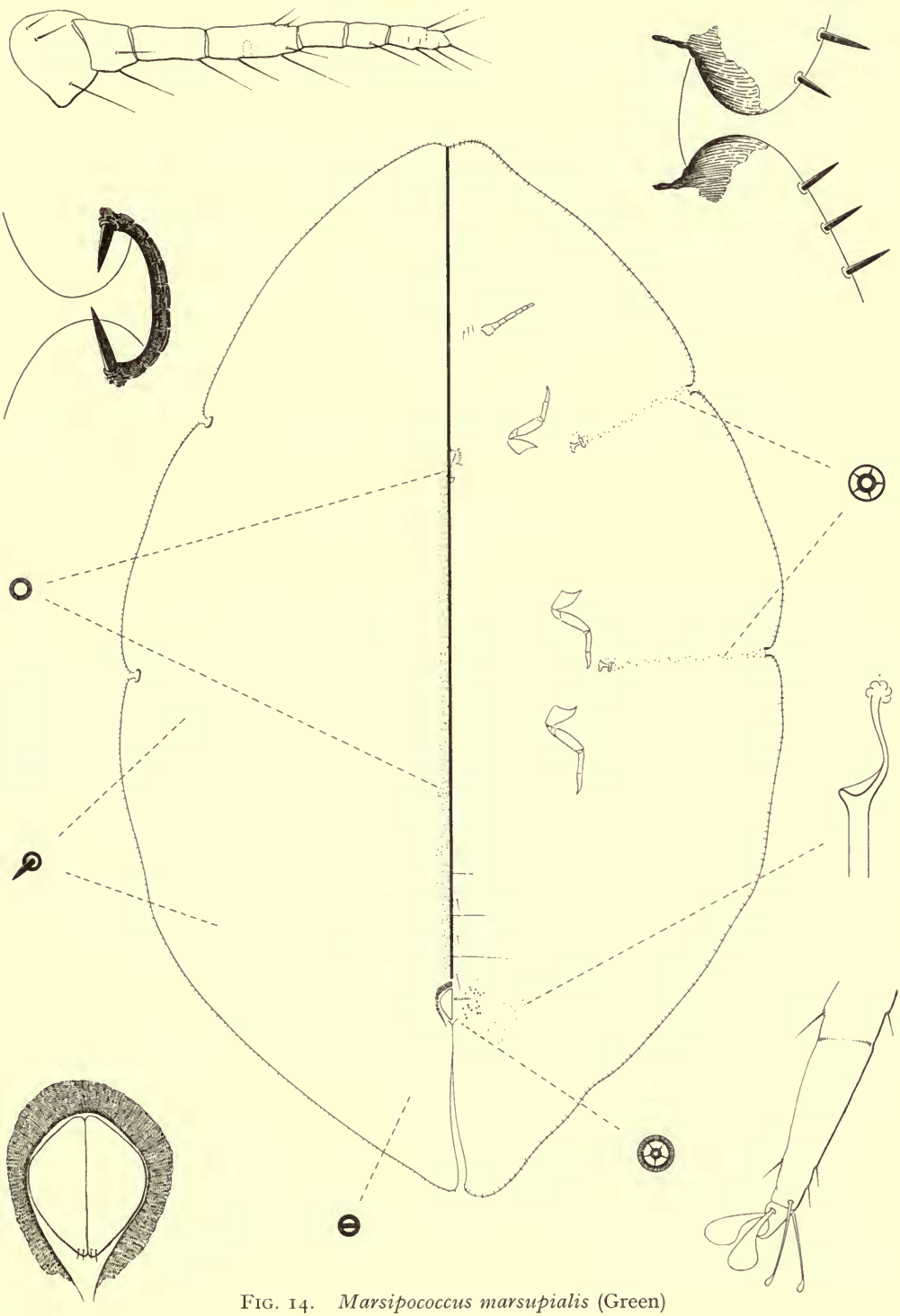

FIG. 14. *Marsipococcus marsupialis* (Green)

reliable character is to be found in the shape of the dorsal setae, which in *Parasaissetia* are cylindrical or slightly swollen at the apex, while in *Saissetia* they are strongly spiniform to stoutly conical.

Thus amended the genus *Parasaissetia*, besides the type-species and *P. ficicola* here described as new, should include *Saissetia nairobica* De Lotto, 1957. The three species can be separated by using the following provisional key:

1 Multilocular pores, though few, always extending in loose transverse rows on the abdominal segments anterior to the genital opening; dorsal dermis marked with polygonal pale areas set close to one another. 2

Multilocular pores about the genital opening only; dorsal dermis with small oval or rounded pale areas set rather widely apart . . . . . ***nairobica***

2 (1) Fold of the anal invagination with numerous small membranous spur-like processes . . . . . ***ficicola***

Fold of the anal invagination finely to broadly crenulate . . . . . ***nigra***

Parasaissetia ficicola sp. n.

(Text-fig. 15)

Living adult females at maturity broadly elliptical, highly convex to nearly conical; dorsal surface smooth; colour evenly very dark brown, almost black; dimensions: length 1·8–3·1 mm.; width 1·3–1·9 mm.; height up to 2 mm. Mounted specimens broadly elliptical, 1·6.2·4 mm. long. Dorsal dermis marked by a fairly regular reticulate pattern as in the common nigra scale. Each polygonal area encloses a minute circular pores with two loculi. Dorsal setae small, cylindrical, at times very slightly swollen at the apex. Paraopercular pores hemispherical, set in two small groups on either side of the median line, in front of the anal opercula; the total number ranges from 12 to 17. Submarginal pores 2 to 10 altogether. Anal opercula roughly quadrate, with two small slender apical setae; outer angle pointed; posterior lateral margin broadly rounded; length 146–160μ; combined width 182–197μ. Marginal setae all broadly flattened and variously dentate at the apex; length 22–30μ; 10 to 15 setae occur between the anterior and posterior stigmatic clefts. Stigmatic spines three; median 44–58μ long; laterals 10–15μ. Multilocular pores rather numerous about the genital opening; a few pores extend in very loose transverse rows on all preceding abdominal segments. Quinquelocular pores arranged in bands one or two pores wide. Tubular ducts numerous and set in a ventral submarginal band, interrupted between the attachment of the antennae and the row of quinquelocular pores associated with the anterior stigmatic openings. Legs well developed without tibio-tarsal articulatory sclerosis; ungual digitules not differentiated in shape and size; dimensions of legs (iii): trochanter plus femur 182–197μ; tibia plus tarsus 204–241μ. Antennae 8-segmented, at times reduced to seven segments with a pseudoarticulation on the fourth; total length 314–358μ. Fold of the anal invagination provided with numerous small, spur-like, membranous processes, and with 5 to 7 (normally 6) setae altogether.

KENYA: Nairobi, 14.xii.1960, ♀ holotype and 9 ♀♀ paratypes collected on branches of *Ficus mallatocarpa* Warb. (Moraceae) (*G. De Lotto*). Coll. No. 2525.

The holotype and six paratypes have been deposited in the British Museum (Natural History), London; three paratypes in the U.S. National Collection of Coccoidea, Washington, D.C.

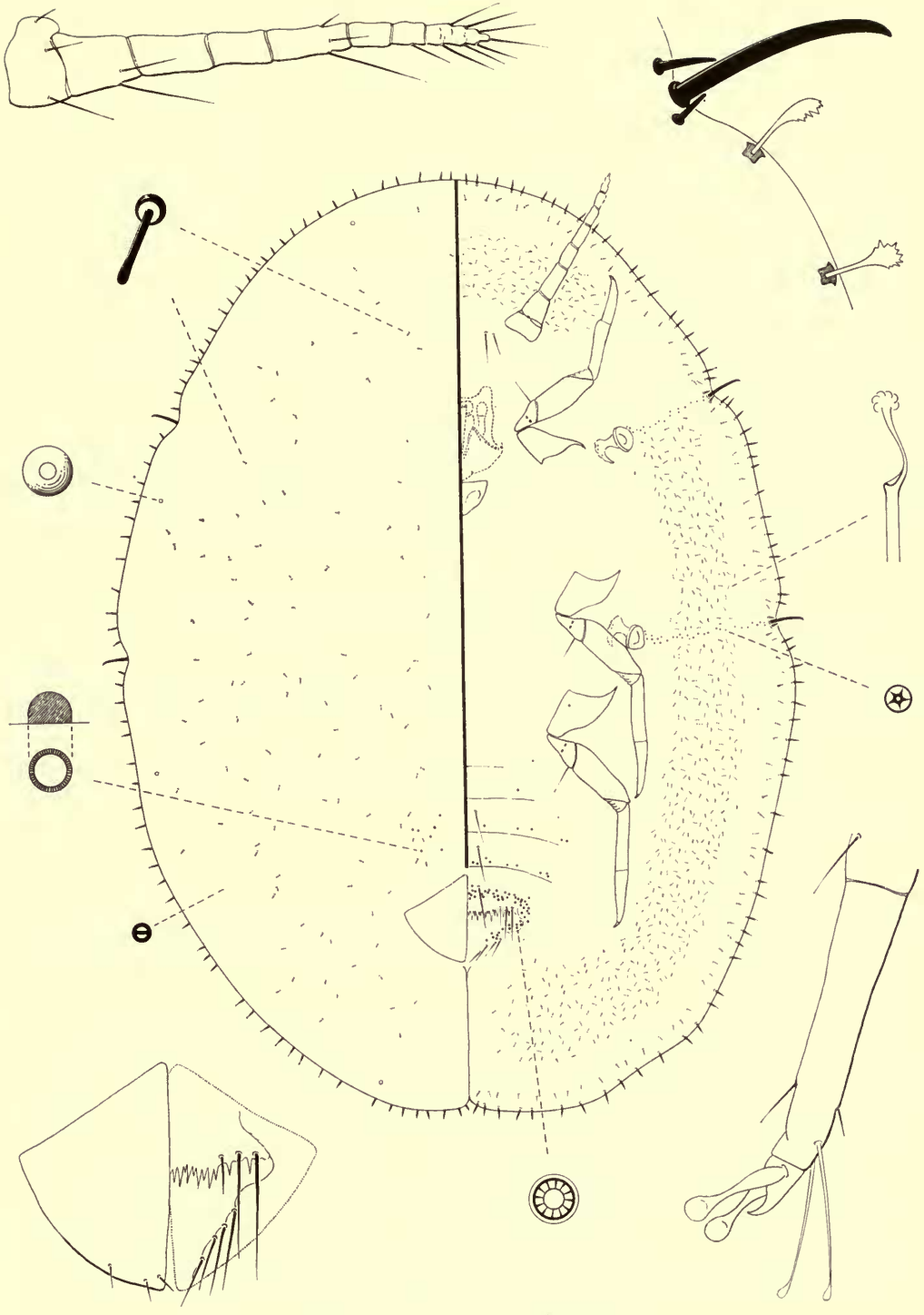

FIG. 15. *Parasaissetia ficicola* sp. n.

Other records of the species on material not included in the type-series, are:

KENYA: Nairobi, 6.i.1956 and 30.xii.1960 on *Ficus* sp. (*G. De Lotto*); 27.viii.1958 on *Ficus* sp. (*K. A. Harrison*). Kisumu, 21.iv.1957 on *Ficus* sp. (*G. De Lotto*).

TANGANYIKA: Mwanza, 20.x.1961 on *Ficus* sp. (*G. De Lotto*).

UGANDA: Entebbe, 22.vi.1961 and 13.xi.1961 on *Ficus populifolia* Vahl (*G. De Lotto*).

This species may easily be confused with some forms of the common *P. nigra*. The only diagnostic character by which the two species can be separated, is the presence in *ficicola* of numerous, small membranous spur-like processes on the fold of the anal invagination, visible only in healthy specimens at the beginning of the adult stage. In the common nigra scale, *P. nigra* (Nietner, 1861), the fold is always finely to broadly crenulate.

It cannot be ruled out that *P. ficicola* may be the same species which King (1902) described as *Saissetia nigrella* from South Africa on *Ficus* sp. From King's original description I understand that the specimens he had at hand were fairly old or fully mature females, hence of no use at all for the solution of this question.

Parasaissetia nairobica (De Lotto, 1957) **comb. n.**

Saissetia nairobica De Lotto, 1957: 173.

TANGANYIKA: Arusha, 25.i.1961, on *Ficus sycomorus* Linn. (Moraceae) (*G. De Lotto*).

PULVINARIA Targioni-Tozzetti, 1867

Ampelocecis Amyot, 1847: 502 [*nomen oblitum*].
Pulvinaria Targioni-Tozzetti, 1867: 13.

Type-species: *Coccus vitis* Linnaeus, 1758.

The genus *Pulvinaria* has been split by Borchsenius (1952, 1953) into many new genera. The identity of the type-species of some of them is not adequately known to me at present.

Into *Pulvinaria* are usually placed species which at maturity produce a cottony ovisac. It seems to me that, at least in some instances, the presence of the ovisac should be retained as a feature of secondary importance. A case in point is represented by *Coccus aethiopicus* De Lotto, 1959; *C. africanus* (Newstead, 1898); *C. celatus* De Lotto, 1960 and *C. consimilis* De Lotto, 1960, which display a closer morphological affinity with *Pulvinaria* than with *Coccus*, though none of them forms an ovisac.

A redescription and a diagram of the type-species *Coccus vitis* Linnaeus, 1758, have been presented by Steinweden (1946). According to Lindinger (1937) the "*Coccus vitis* auct." associated by Targioni-Tozzetti with his genus *Pulvinaria* should be understood as a misidentification of *Coccus betulae* Linnaeus, 1758.

Pulvinaria tenuivalvata (Newstead, 1911) comb. n.

(Text-fig. 16)

Lecanium tenuivalvatum Newstead, 1911*a*: 92.

The original description of this species was based on a series of nymphs, most of which were attacked by parasitic Hymenoptera. The insect is here redescribed on a single adult female found among an old batch of other nymphs collected in the type locality and on the type host plant, some of which were compared by me with Newstead's paratypes deposited in the British Museum (Natural History), London.

Ovisac not seen. Body elongate oval; length 3·7 mm. Dorsal dermis membranous. Dorsal pores apparently absent. Dorsal setae short, conical, fairly numerous and apparently distributed without any regular pattern. Paraopercular pores flat, with a granulate surface, set in an elongate group of about 30 in front of the anal opercula. Submarginal pores lacking. Anal opercula roughly quadrate*, with one seta socket on the subdiscal area, and two near the apex, but all setae were broken away; length 170μ; combined width 175μ. Marginal setae stout, spiniform, variable in size, ranging from 22 to 37μ in length. The number of setae occurring between the anterior and posterior stigmatic clefts is 27 in one side and 28 in the opposite side. Stigmatic spines three, all robust and slightly lanceolate in shape; median 35–40μ long; laterals 25–30μ. Multilocular pores not numerous around the genital opening and extending in loose transverse rows on all preceding abdominal segments. Quinquelocular pores set in irregular bands two or three pores wide. Tubular ducts numerous and arranged in a narrow submarginal band, interrupted near the anterior and posterior ends of the body. Legs well developed with a tibiotarsal articulatory sclerosis; claws with a minute denticle; one of the ungual digitules slender; the other stout; both apically knobbed; dimensions of legs (iii): trochanter plus femur 263μ; tibia plus tarsus 277μ. One of the antennae was missing; the other—very likely abnormal—was formed with only six segments; total length 205μ. Fold of the anal invagination with altogether four setae.

Uganda: Entebbe, 18.ii.1910, on citronella grass ** (*C. C. Gowdey*).

The unique specimen, a fairly young adult female, slightly distorted but otherwise in rather good condition, has been deposited in the British Museum (Natural History), London, (coll. No. 2057).

This species is closely related to *Pulvinaria iceryi* (Signoret, 1869) and to *P. elongata* Newstead, 1917, but differs from both in that the claws of all legs are provided with a small denticle; the dorsal setae are conical and in the absence of tubular ducts on the ventral midregion of the abdomen. It should be noted that all three species have been described or recorded only from gramineous plants.

A detailed study on the identity of *elongata* and *iceryi* has been recently presented by Mamet (1958).

* The lateral posterior margin of one operculum was somewhat distorted.

** *Cymbopogon citratus* (D.C.) Stapf (Gramineae).

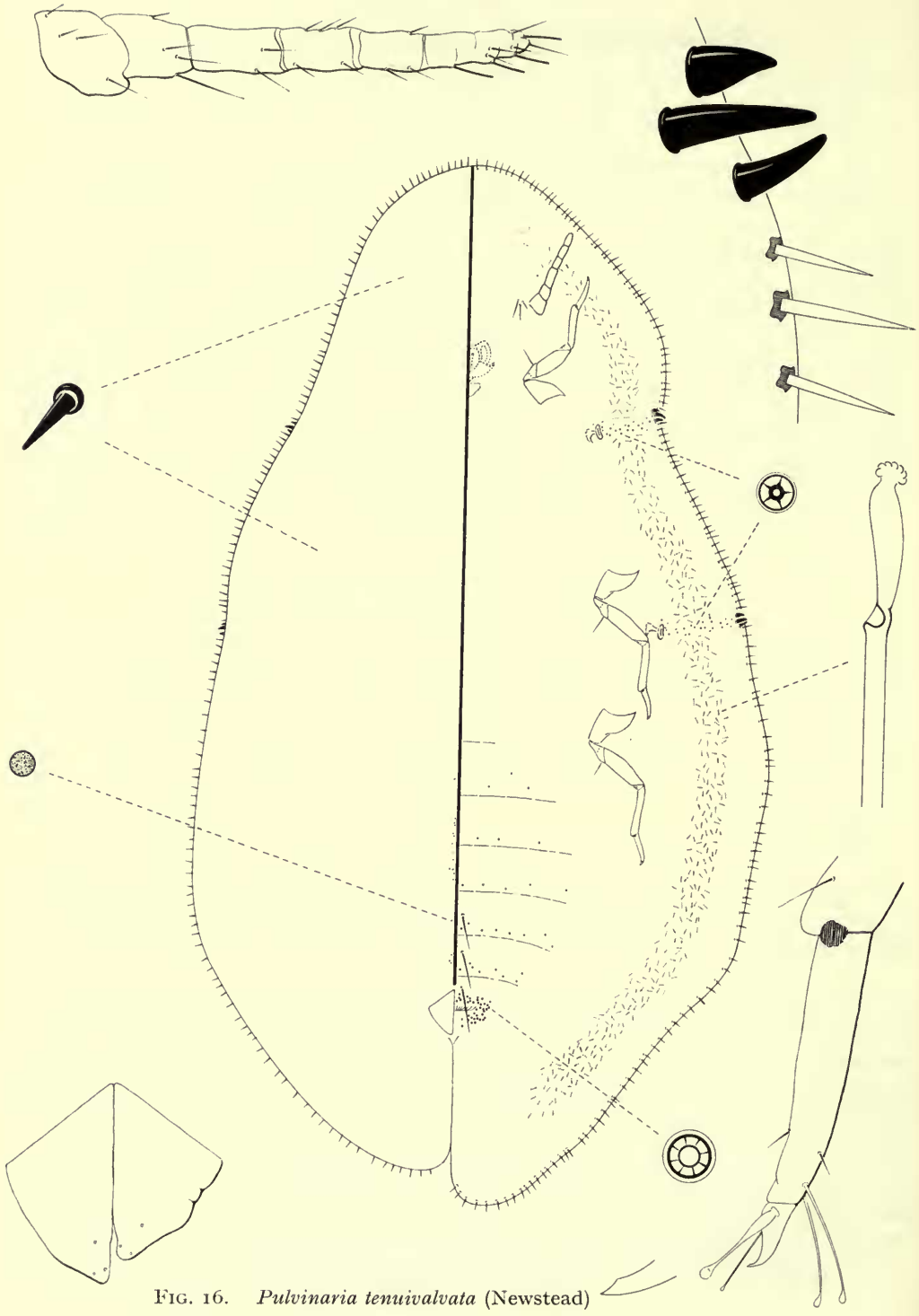

FIG. 16. *Pulvinaria tenuivalvata* (Newstead)

SAISSETIA Déplanche, 1859

Saissetia Déplanche, *in* Eudes-Deslongchamps, 1859: 206.

Type-species: *Lecanium coffeae* Walker, 1852=*Saissetia coffeae* Déplanche, 1859.

Before discussing the characters and composition of this genus, a few words have to be said about its source and the identity of the type species.

The paper published on pages 203-207 of the fourth volume (1859) of the *Bulletin de la Société linnéenne de Normandie*, currently retained the first source of the genus *Saissetia*, is not Déplanche's original work, but a short account of it written by Eudes-Deslongchamps. Déplanche's paper, or memoir, was published in Tahiti sometime earlier. All efforts to trace a copy of it have failed so far.

More important is the problem of the identity of the type-species of the genus, which had nothing to do with the species usually assigned to *Saissetia*. The confusion was originated by Fauvel (1865) who arbitrarily synonymized *S. coffeae* Déplanche with *Lecanium coffeae* Walker. According with the description presented by Eudes-Deslongchamps, the adult females:

"sont caractérisées par un corps peu épais, aplati, mou, de forme ovalaire; par des antennes composées de neuf articles, et par des tarses n'en ayant qu'un seul. Le corps présente des anneaux bien distincts, terminés, de deux en deux, par des languettes diminuant d'arrière en avant. A côté des deux languettes postérieures, inégales et les plus longues, un peu en dehors, sont deux soies noires allongées, terminées en pointe. Toute la surface du corps sécrète une matière blanchâtre, cotonneuse qui la recouvre entièrement . . . . A l'époque de la fécondation, le corps des femelles sécrète la matière cotonneuse en plus grande abondance. Une fois cet acte accompli, elles se cramponnent sur la tige où elles s'étaient établies. La matière cotonneuse disparaît insensiblement et n'est pas renouvelée. Peu après le corps se dessèche, les anneaux s'effacent, il ne reste plus qu'une petite écaille scutiforme, de couleur grisâtre, qui semble se confondre avec l'écorce."

The description leaves no doubts that the insect studied by Déplanche was by no means a hard scale, but very likely a mealy bug. Hence the name *Saissetia* should be dropped and the species at present included in it be transferred to *Neobernardia* Cockerell, 1892, which is the first valid generic name available for them. No changes, however, are introduced here, pending further attempts to secure a copy of Déplanche's original paper.

Several species have been referred to, or described under, the genus *Saissetia* in the present series of papers dealing with the Coccidae of Africa south of the Sahara. A first attempt to split the group was made by Takahashi (1955) with the introduction of the genus *Parasaissetia*. Besides the type-species, two other species from the area under review have been referred to it. More recently a few species characterized in having the anal opercula pyriform have been transferred by the writer (De Lotto, 1963) to the genus *Udinia*. The forms still retained in *Saissetia* may be separated into three small natural groups, which later may be recognized as distinct subgenera or genera. The main features of these groups are:

Group 1: tubular ducts forming the ventral submarginal band having the inner duct as large or larger than the outer duct; dorsal setae slender, spiniform. This group includes at present only the type-species *Lecanium coffeae* Walker, 1852.

Group 2: tubular ducts with the inner duct much smaller than the outer one; dorsal setae spiniform but slender; dorsal dermis marked with pale areas which are large and close to one another along the marginal and submarginal areas, and tend to be smaller and widely apart at the centre of the dorsum. To this group should be referred: *Saissetia chitonoides* De Lotto, 1963; *S. orbiculata* De Lotto, 1963; and *Lecanium somereni* Newstead, 1911. They can be separated by the following provisional key:

1		Legs with an articulatory sclerosis between tarsus and tibia 2
		Tibio-tarsal articulatory sclerosis lacking . . . . . ***somereni***
2	(1)	Marginal setae all attaining the same length; submarginal pores 1 to 8 altogether; number of multilocular pores on the most anterior abdominal segment ranging from 9 to 23; antennae 335–385μ long. . . . . ***chitonoides***
		Marginal setae of different sizes; submarginal pores 22 to 27; multilocular pores on the most anterior abdominal segment 73 to 111; antennae 440–510μ long ***orbiculata***

Lecanium (*Saissetia*) *subpatelliforme* Newstead, 1917, described from GHANA on an unidentified host plant, is strongly suspected to be identical with *somereni*.

Group 3: tubular ducts as in group 2; pale areas of the dorsal dermis all practically attaining the same size and set close to one another; dorsal setae strongly spiniform to conical. This group includes: *Saissetia abyssinica* sp. n.; *S. jocunda* De Lotto, 1957; *S. munroi* De Lotto, 1958, *Chermes oleae* Bernard, 1782; *S. opulenta* De Lotto, 1957; *Lecanium* (*Saissetia*) *persimile* Newstead, 1917; *S. privigna* sp. n.; *S. xerophila* De Lotto, 1957; and *S. zanzibarensis* Williams, 1953. The species can be separated by using the following provisional key:

1		Multilocular pores about the genital opening only 2
		Multilocular pores extending in transverse rows on all abdominal segments . 3
2	(1)	With 6 to 10 marginal setae between the anterior and posterior stigmatic clefts; all setae flattened and frayed at the apex; length up to 22-30μ . . ***xerophila***
		Marginal setae between the stigmatic clefts ranging from 18 to 29, all slender and finely pointed; length up to 95–130μ . . . . . ***zanzibarensis***
3	(1)	Marginal setae not differentiated in size . . . . . ***opulenta***
		Marginal setae distinctly different in size 4
4	(3)	Submarginal pores absent 5
		Submarginal pores always present 6
5	(4)	Paraopercular pores set in a small group of 7 to 10 in front of the anal opercula only . . . . . ***munroi***
		Paraopercular pores arranged in a large group of 40 to 150 in front and extending on either side of the anal opercula . . . . . ***persimilis***
6	(5)	Ventral submedian area of the abdominal segments with supplementary groupings of tubular ducts . . . . . ***abyssinica***
		Supplementary groupings of ducts absent 7
7	(6)	With a grouping of dorsal setae on the submedian area in front of the anal opercula; dorsal setae near the margin noticeably smaller than those occurring on the median and submedian areas of the body . . . . ***jocunda***
		Dorsal setae scattered and not appreciably differentiated in size . . . 8
8	(7)	With 15 to 23 marginal setae between the anterior and posterior stigmatic clefts . . . . . ***privigna***
		With only 3 to 12 marginal setae between the stigmatic clefts . . . ***oleae***

The systematic position of *Saissetia monotes* Hall, 1935, described from SOUTHERN RHODESIA on specimens living on *Monotes glaber* Sprague, is uncertain, as no types or other material have been seen yet. The general appearance of *S. monotes pretoriae* Hall, 1939, which was described from SOUTH AFRICA on *Ficus* sp., suggests a close affinity with *S. opulenta*. The condition of the specimens at hand, including some of the paratypes, is however unsuitable for a redescription.

Saissetia abyssinica sp. n.

(Text-fig. 17)

Adult females at full maturity highly convex, nearly hemispherical, with a rather poorly developed H-mark on the dorsum; colour evenly dark brown. Young adults (alcohol material) yellowish white. Mounted specimens 1·6–1·8 mm. long. Dorsal dermis marked with numerous rounded or oval pale areas, not differentiated in size and set close to one another; each pale area encloses a minute pore. Dorsal setae robust, bluntly pointed; all setae attain the same size and are distributed without any regular pattern. Paraopercular pores hemispherical, very slightly variable in diameter, and set in a close group of 16–25 in front of the anal opercula. Submarginal pores reduced to one only on the head or mesothorax. Anal opercula together roughly quadrate, with a short, robust, discal seta, and three slender, apical ones; posterior lateral margin broadly rounded; outer angle pointed; length 175-182μ; combined width 196–210μ. Setae of the marginal fringe short, stout, rather deeply frayed at the apex; length 28-31μ. Among these setae are irregularly intermingled others which are either similar in shape or pointed, but shorter, being only 17–21μ long. On the margin of the body between the anterior and posterior stigmatic clefts are inserted 9 to 16 setae, of which 8–11 are large and 1–5 small. Stigmatic spines three; median 70–77μ; laterals 20–24μ. Multilocular pores numerous around the genital opening and extending in transverse rows on all preceding abdominal segments. Quinquelocular pores set in bands two or three pores wide. Tubular ducts numerous and arranged in a ventral submarginal band. Other ducts similar to those of the submarginal band, but shorter, are crowded on the submedian area of all abdominal segments. Antennae 8-segmented; total length 357–385μ. Legs well developed without tibio-tarsal articulatory sclerosis; ungual digitules of same size and shape; dimensions of legs (iii): trochanter plus femur 210–217μ; tibia plus tarsus 224–231μ. Fold of the anal invagination with 4 or 5 robust setae.

ETHIOPIA: Dire Dawa, 27.x.1963, ♀ holotype and 2 ♀♀ paratypes collected on branches of *Duranta repens* Linn. (Verbenaceae) (*B. G. Hill*). Coll. No. H.C. 762.

The holotype and one paratype are in the South African National Collection of Insects, Pretoria; one paratype will be deposited in due course in the British Museum (Natural History), London.

Saissetia coffeae (Walker, 1852)

Lecanium hemisphaericum Targioni-Tozzetti; Lindinger, 1913: 82.
Lecanium (*Saissetia*) *hemisphaericum* Targioni-Tozzetti; Newstead, 1917 *b;* 130.
Saissetia hemisphaerica (Targioni-Tozzetti) Brain, 1920: 9.
Saissetia coffeae (Walker) Laing, 1928: 215.
Saissetia hemisphaerica (Targioni-Tozzetti); Hall, 1935: 78.
Saissetia hemisphaerica (Targioni-Tozzetti); De Lotto, 1956: 240.

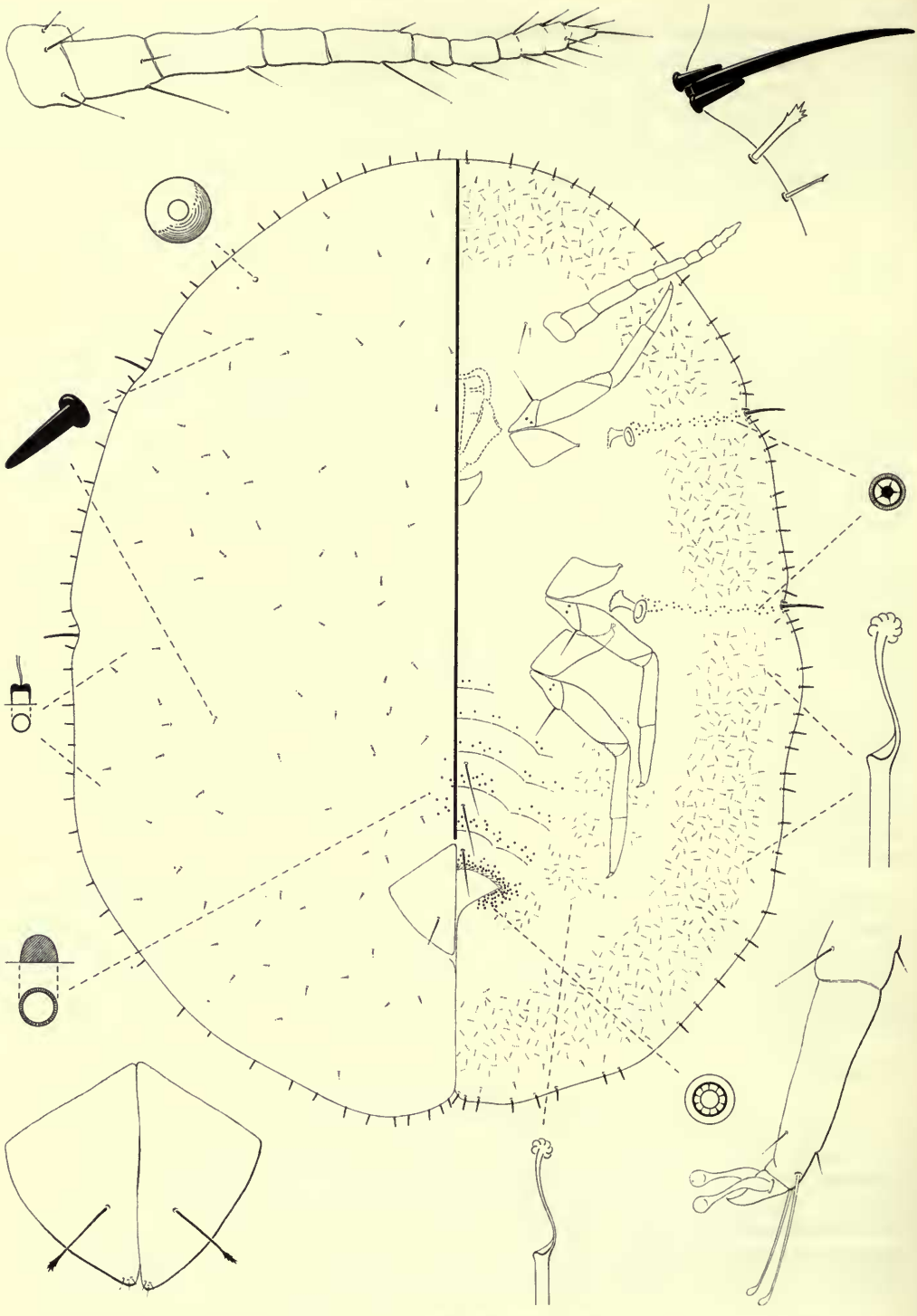

FIG. 17. *Saissetia abyssinica* sp. n.

The identity and nomenclatural status of this species have been recently discussed by Williams (1957), who pointed out that the name *Lecanium coffeae* Walker, 1852, should be used in place of *L. hemisphaericum* Targioni-Tozzetti, 1867. The present writer fully concurs with his views.

KENYA: Nairobi, 13.i.1955, on *Nephrolepis* sp. (Polypodaceae), 30.xii.1960, on *Markhamia platycalyx* (Baker) Sprague (Bignoniaceae), 31.xii.1960, on *Schinus molle* Linn. (Anacardiaceae) (*G. De Lotto*). Kisii, 20.iv.1959, on roots of *Coffea arabica* Linn. (Rubiaceae) (*A. R. Melville*).

Saissetia oleae (Bernard, 1782)

(Text-figs. 18-20)

Chermes oleae Bernard, 1782: 108.

On account of the views here held about the distribution of *S. oleae* in Africa, all references of the species from this continent have purposely been omitted.

For a long time the identification of this species merely rested on the well known H-mark occurring on the dorsum of the adult female. Later, authors gave short descriptions of the antennae, legs, stigmatic spines, etc. Though some of these features may have a taxonomic significance, the fact that they were dealt with very superficially, compounded with the utter disregard to other characters, make their diagnosis entirely unreliable. The first comprehensive account of *oleae* was presented by Ferris (*in* Zimmerman, 1948). His description, however, was made on material from California, and lacks of all quantitative data.

The following redescription is based on a long series of specimens from many countries of the Palaearctic Region as listed below. A young adult female collected on *Olea europaea* Linn. at Enna (Sicily) was used for the accompanying diagram.

Dorsal areolation and dorsal pores as typical of the group. Dorsal setae robust, spiniform, very slightly blunted at the apex, and tending to be only very slightly smaller towards the margin of the body. The setae are scattered without any regular pattern. Paraopercular pores hemispherical, somewhat variable in diameter, and set in a group of 3 to 46 in front of the anal opercula. Submarginal pores ranging from 4 to 16 altogether. Anal opercula together roughly quadrate; length 139–182μ; combined width 153–219μ. Each operculum is provided with a longish, robust discal or subdiscal seta, and three small, slender apical ones. Marginal setae of two sizes. The larger ones are robust, tapering towards the apex, with tips either rounded or with a few minute indentations; length 36–51μ. The small setae are only 18–33μ long and are often finely pointed. The number of setae occurring between the anterior and posterior stigmatic clefts varies from 3 to 12, of which 3–9 are large and 0–4 small. Stigmatic spines three; median 69–118μ; laterals 15–33μ. Multilocular pores numerous about the genital opening and extending in rather irregular transverse rows on all preceding abdominal segments. Quinquelocular pores arranged in bands one or two pores wide. Tubular ducts arranged in a submarginal band on the ventral side of the body, as normal in all species of the genus so far studied. Antennae 8-segmented; occasionally one antenna may be reduced to seven segments, one of which being marked with a pseudoarticulation; total length 287–365μ. Legs well developed; ungual digitules of the same size and shape, both stout and knobbed at the apex; tibio-tarsal articulatory sclerosis normally lacking. At times some of the legs (very seldom all) are provided with a sclerosis which, however, is much reduced in size. Dimensions of legs (iii): trochanter plus femur 161–204μ; tibia plus tarsus 168–241μ. Fold of the anal invagination with 6, 7 or 8 setae.

Altogether 91 specimens have been examined. Many of them were intercepted at the plant quarantine inspection stations in U.S.A.

ALGERIA: Algiers, on lemon twigs; at New York, 15.iii.1943 (*Byars & Ortiz*), N.Y. 93153. Algiers, on zutima navel orange; at Washington, D.C., 27.iii.1926 (*W. B. Wood*), F.H.B. 61194. Algiers, on *Citrus* sp. (navel orange); at Washington, D.C., 27.iii.1926 (*W. B. Wood*), F.H.B. 61195. No locality, on *Pyrus longipes*; at Washington, D.C., 6.ii.1926 (*O. K. Courtney*), F.H.B. 60293.

AUSTRIA: Tyrol, Innsbruck, 17.ix.1953, on *Viscum album* ex *Pinus sylvaticus* (*K. Boratynski*).

CYPRUS: Famagusta, 28.iv.1930, on *Cydonia* sp. and quince (*H. M. Morris*).

ENGLAND: Kent, Yalding: no date, on *Nerium oleander* (under glass) (*E. E. Green?*). Cambridge, 6.ii.1935, on *Nerium* sp. (*H. C. James*), No. 13. Locality unknown, on *Olearia* sp. leaves; at Seattle, 18.iv.1959 (*W. J. N. Brown*), Seattle 14700.

FRANCE: Antibes, 7.i.1958, on olive and myrtus (*H. L. Parker*), 5752. Nancy, on *Abutilon*, at D.C., 23.iv.1934 (*W. B. Wood*), B.P.Q. A.25909. Localities unknown; on *Osteospermum* sp.; at D.C., 7.v.1957 (*J. F. Schoen*), W. 5423. On *Ilex wilsoni*; at D.C., 16.vii.1957 (*J. F. Schoen*), W. 5729.

ITALY: Naples, 12.iv.1961, on *Olea europaea* Linn. (*E. Tremblay*). Reggio Calabria, 23.iv.1960, on *Nerium oleander* Linn. (*G. De Lotto*). Near Varazze, no date, on *Erica arborea* Linn. (*O. Japp*), Japp Coll. No. 155. Taranto, 1.xi.1917, on olive (coll. unknown), 12469. Localities unknown. On *Abutilon* sp. (ex Leonardi's *Chermotheca italica*). On citrus leaves; at New York, 2.ii.1960 (*P. Snowden & N. Kitazaki*), N.Y. 159598. On lemon; at New York, 30.iii.1939 (*Woodbury*), N.Y. 80987. On lemon leaves; at New York, 1.vi.1931 (*A. M. Bulbulia*), N.Y. 16835. On lemon leaves; at New Orleans, 24.iv.1931 (*Moore & Pritchett*), N.O. 4817. On *Nerium oleander*; at Chicago, 24.xii.1924 (*L. M. Scott*), Chicago 241. On *Cheirostemon platanoides*; at D.C., 21.v.1957 (*J. F. Schoen*), W. 5450. On olive leaves; at New York, 30.iii.1933 (*Shemin, Sartor & all.*), N.Y. 20409. On *Citrus limonia*; at Philadelphia, 23.iv.1933 (*A. B. Wells*), Phila 7408. On oleander leaves; at Boston, 14.x.1955 (*E. C. Hodson & J. D. Crump Jr.*), Boston 22132. On oleander?; at Chicago, 27.viii.1947 (*F. O. Dodd*), Chicago 1328. On oleander; at Hoboken, 29.viii.1947 (*Adams*), Hoboken 9704. On pear fruit; at New York, 28.xi.1935 (*Sartor*), N.Y. 49797. On orange twigs; at Philadelphia, 10.ii.1934 (*A. B. Wells*), Phila 20750. On *Nerium oleander*; [at Boston], 12.ix.1953 (*E. C. Hodson & M. F. Crowell*), Boston 20392. On lemon peduncle; [at New York], 19.iv.1960 (*F. Burke & D. Linchan*), N.Y. 162205.

PORTUGAL: Faro, 28.vii.1931, on peach tree (*H. Stiner*).

SICILY: Enna, 15.iv.1961, on *Olea europaea* Linn. (*P. Buchner*). Siracusa, 18.iv.1961, on *Olea europaea* Linn. (*do.*). Locality unknown: on orange, at Baltimore, 26.v.1931 (*W. A. Ranck*), Baltimore 237.

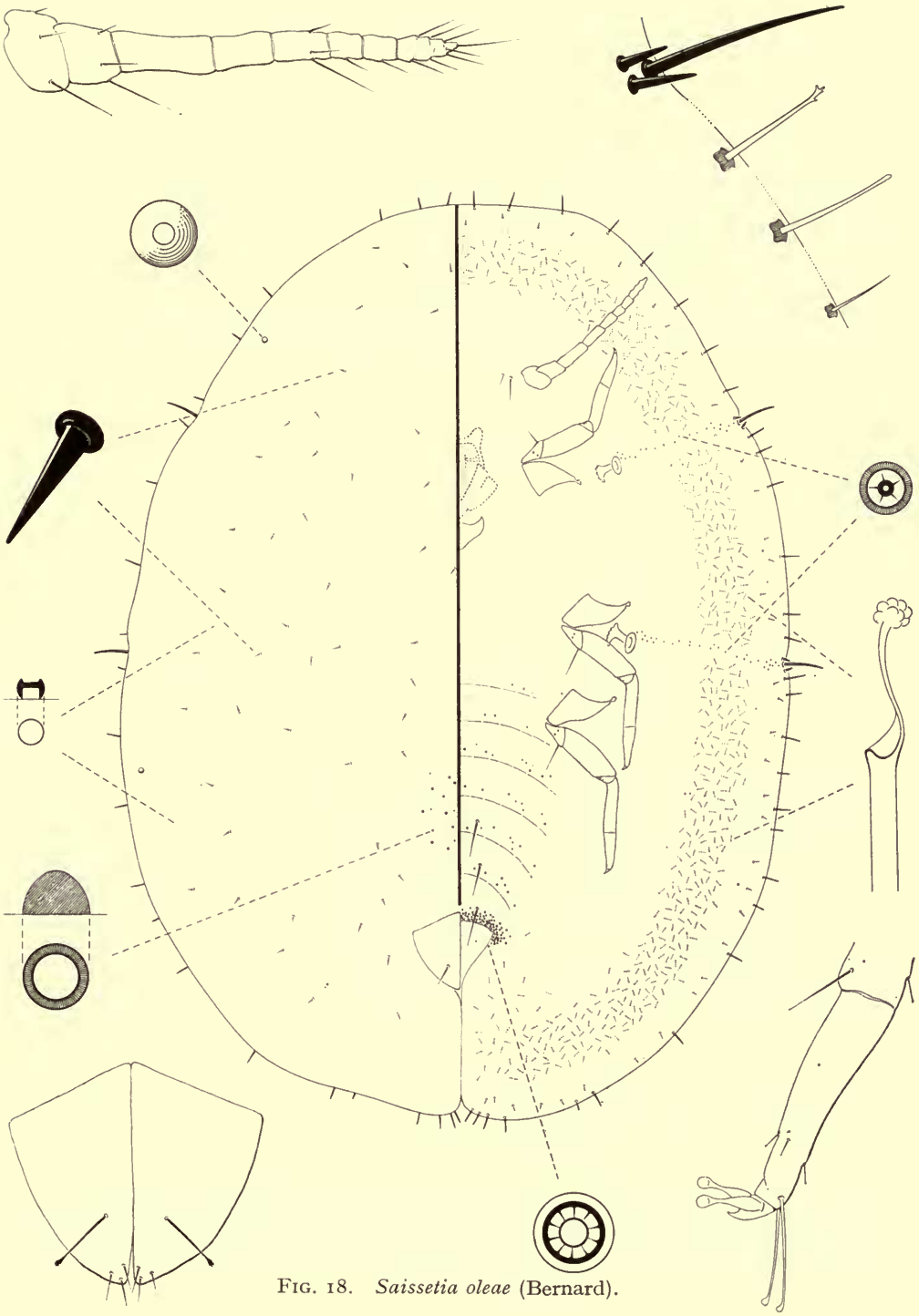

FIG. 18. *Saissetia oleae* (Bernard).

SPAIN: Saville, on olive (bark), at D.C., 17.iii.1928 (*R. G. Coqswell*), F.H.B. 73739. Locality unknown; on *Evonymus* leaves; at New York, 21.xii.1935 (*C. P. Daley*), N.Y. 50867.

SWITZERLAND: Basle, 14.ii.1961, on *Metroxylon* sp. (in greenhouse) (*R. Weiniger*).

The structures which in the course of the present study have been found to have a major significance on determining the facies of the species and hence on clearing up its morphological relationship with other African forms close to it, are the absence or strong reduction of the tibio-tarsal articulatory sclerosis and the number and shape of the setae of the marginal fringe.

The articulatory sclerosis in *oleae* is normally lacking or, when present, it tends to be much reduced in size. In an attempt to represent graphically its occurrence and range of variation, legs were arranged in four classes. In class **0** were grouped legs

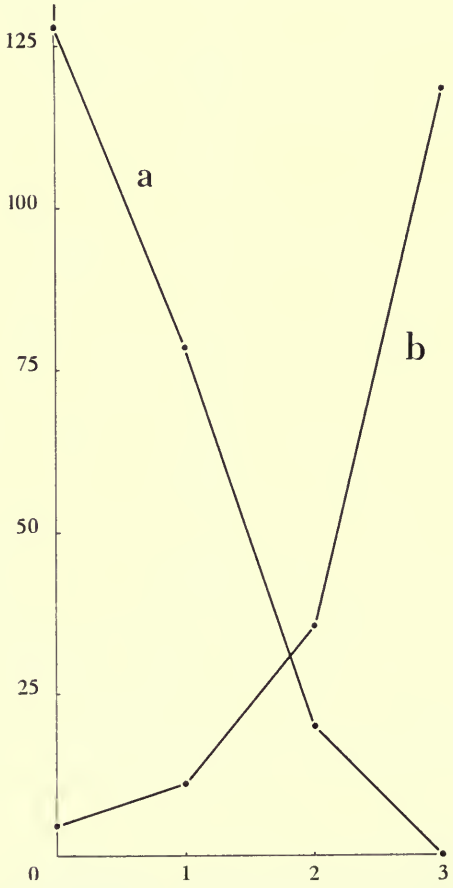

FIG. 19. Occurrence and development of the tibio-tarsal articulatory sclerosis in *Saissetia oleae* (Bernard): **(a)** in typical specimens from the palaearctic region: **(b)** in specimens from South Africa.

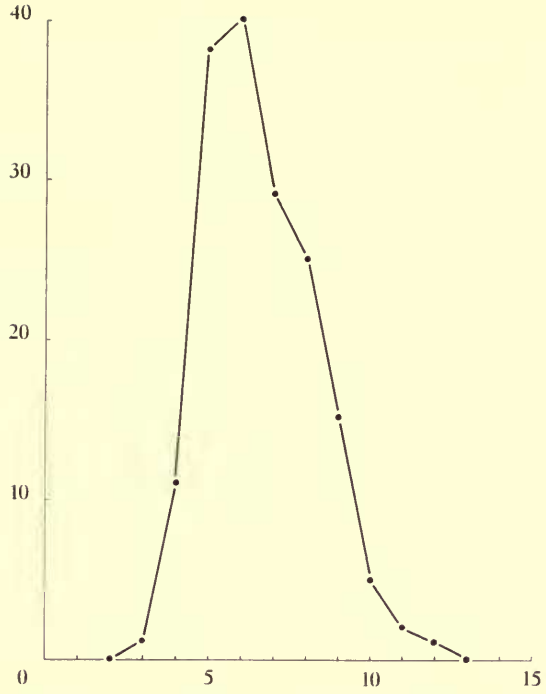

FIG. 20. Frequency distributions of the number of marginal setae occurring between the stigmatic clefts in *Saissetia oleae* (Bernard).

entirely devoid of any sclerosis, while to classes **1, 2** and **3** were referred those in which the sclerosis was poorly, moderately or strongly developed respectively. Fig. 19*a* shows the frequency distributions found in 38 specimens from *Olea europaea* Linn. collected at Enna, Siracusa (Sicily) and Naples (Italy); and from *Metroxylon* sp. at Berne (Switzerland)*. Out of 91 specimens examined, fifteen (that is 16.5% of the total) did not apparently agree with the general pattern, for the sclerosis looked strongly developed. It should however be noted that the conditions of these specimens were far from being satisfactory. They were either overstained or attacked by fungi or the tissues of the derma were badly damaged very likely by the action of bacteria or viruses.

In *oleae* the marginal setae are of two sizes. The fringe is formed mostly by setae of the larger size, usually set widely apart from one another, among which are irregularly intermingled a few small ones. Though the number of setae varies remarkably, even among specimens of the same population, its variation stretches

* There was no bias on the use of these specimens. Their choice was simply motivated by the fact that they were collected from healthy populations, mounted at the right stage and properly stained, therefore better suitable for this sort of observations. The whole lot will be deposited in due course in the collection of the British Museum (Natural History), London.

within definite limits. From Fig. 20, which represents the frequency distributions of the number of setae occurring between the anterior and posterior stigmatic clefts on either side of the body (167 samples), we can deduce that in *oleae* specimens with less than 3 or more than 12 setae are extremely rare or may not occur at all.

As indicated in the description, the setae of the larger size are slightly tapering towards the apex and have their tips rounded or with a few minute indentations. They are never flattened and frayed at the apex.

If, in spite of the seemingly contradictory but undecisive data observed in some specimens, we assume that in *oleae* the occurrence and variability of the tibio-tarsal articulatory sclerosis constantly conform with the pattern found on the material examined, then we have to conclude that the species does not occur in Africa, except in the north western areas as Algeria and very likely Tunisia.

The specimens from Africa that most closely resemble *oleae* are those from the southern districts of the Cape Province of South Africa. They, however, differ from *oleae* in that the sclerosis is normally strongly developed as shown in Fig. 19*b* which represents the frequency distributions obtained in 27 specimens. In the writer's opinion the specimens from South Africa are referable to a geographic subspecies, for which the name of *Lecanium pumilum* Brain, 1920 is eventually available.

Most of the remaining material from Africa seen was referable to *S. privigna*, a new species in which the setae of the marginal fringe are much more numerous than in *oleae*.

The identity of a few other forms was unknown. The condition and limited number of specimens available did not permit their description.

Saissetia persimilis (Newstead, 1917)

Lecanium (*Saissetia*) *persimile* Newstead, 1917: 362.
Saissetia oleae (Bernard); Lindinger, 1928: 107 [misidentification].
Saissetia persimilis (Newstead) De Lotto, 1956: 243.

Brain's record (1920) from South Africa is omitted, as the specimens identified by him as *S. persimilis* do not actually belong to this species. They are still under study.

KENYA: Mombasa, 31.x.1957, on *Harrisonia abyssinica* Oliv. (Smiarubaceae). Nairobi, 14.xii.1960, on *Grewia* sp. (Tiliaceae); 25.xii.1960, on *Gymnosporia* sp. (Celastraceae); 5.i.1961, on *Hibiscus fuscus* Garke (Malvaceae); 30.xii.1960, on *Croton* sp. (Euphorbiaceae); 30.xii.1956, on *Cordia ovalis* R. Br. (Boraginaceae) (*G. De Lotto*).

SOUTH AFRICA: Transvaal, Pretoria, 28.ii.1957, on *Ficus* sp. (Moraceae) (*G. De Lotto*).

TANGANYIKA: Arusha, 25.i.1961, on *Nerium oleander* Linn. (Apocynaceae), *Ficus* sp and *Hibiscus fuscus* Garke (*G. De Lotto*).

UGANDA: Entebbe, 22.vii.1961, on *Antiarix toxicaria* Lesch. (Urticaceae) (*G. De Lotto*).

Saissetia privigna sp. n.

(Text-fig. 21)

Saissetia oleae (Bernard); De Lotto, 1956: 241 [misidentification].

Fully mature females strongly convex, up to 3 mm. long and 2·5 mm. wide; dorsum with two transverse ridges connected by a longitudinal one, forming the well known H-mark; colour evenly brown. Young adults creamy white. Mounted specimens 1·5–2·7 mm. long. Dorsal dermis with numerous rounded or oval pale areas set closely together and not appreciably differentiated in size. Dorsal setae conical, all attaining the same size and scattered without any pattern. Paraopercular pores hemispherical, set in a loose group of 5 to 9 in front of the anal opercula. Submarginal pores 13 to 22 altogether. Anal opercula together roughly quadrate, with a long, robust, apically frayed discal seta; and three small, slender apical ones; posterior lateral margin broadly rounded; outer angle pointed; length 182–204μ; combined width 182–219μ. Setae of the marginal fringe of two sizes. The larger setae are flattened and frayed or slightly tapering and with a few indentations at the apex; length 66–88μ. The small setae are similar in shape to the larger ones, or pointed; length 29–40μ. On the margin of the body between the anterior and posterior stigmatic clefts there are 15 to 23 setae, of which 9–14 are large and 5–11 small. Stigmatic spines three; median 77–91μ; laterals 26–36μ. Multilocular pores numerous around the genital opening and extending in transverse rows on all preceding abdominal segments. Quinquelocular pores set in bands one or two pores wide. Tubular ducts fairly numerous and forming a submarginal band on the ventral side of the body. Antennae 8-segmented; total length 365–400μ. Legs provided with a well developed tibio-tarsal articulatory sclerosis; ungual digitules of the same size and shape; dimensions of legs (iii): trochanter plus femur 204–226μ; tibia plus tarsus 248-277μ. Fold of the anal invagination with 7 or 8 robust setae altogether.

KENYA: Ruiru, 17.x.1962, ♀ holotype and 9 ♀♀ paratypes collected on branches of *Coffea arabica* Linn. (Rubiaceae) (*G. De Lotto*). Coll. No. 2774.

The holotype and six paratypes have been deposited in the British Museum (Natural History), London; the remaining three paratypes in the U.S. National Collection of Coccoidea, Washington, D.C.

Other records of the species on material not included in the type-series are:

KENYA: Nairobi, 22.x.1951, on *Coffea arabica* Linn.; 12.iii.1953, on *Olea europaea* Linn. (Oleaceae); 21.vi.1953, on *Markhamia platycalyx* (Baker) Sprague (Bignoniaceae); 1.i.1961 and 16.iv.1961, on *Hibiscus fuscus* Garke (Malvaceae) (*G. De Lotto*).

TANGANYIKA: Arusha, 25.i.1961, on *Hibiscus fuscus* Garke (*G. De Lotto*).

The true identity of *S. oleae* having been cleared up, the specific characters of *privigna* become quite evident. In the latter all legs are provided with a well developed tibio-tarsal articulatory sclerosis and the setae of the marginal fringe are twice as many as in the former. The lowest number of setae between the anterior and posterior stigmatic clefts is in *privigna* higher than the maximum occurring in *oleae*. Furthermore in the new species marginal spines, legs and antennae are remarkably longer than in *oleae*.

The area of distribution of *S. privigna* extends from EGYPT and ERITREA to NORTHERN and SOUTHERN RHODESIA. Small variations on some characters were observed in samples from these territories which suggest the presence of a complex of geographical forms or subspecies.

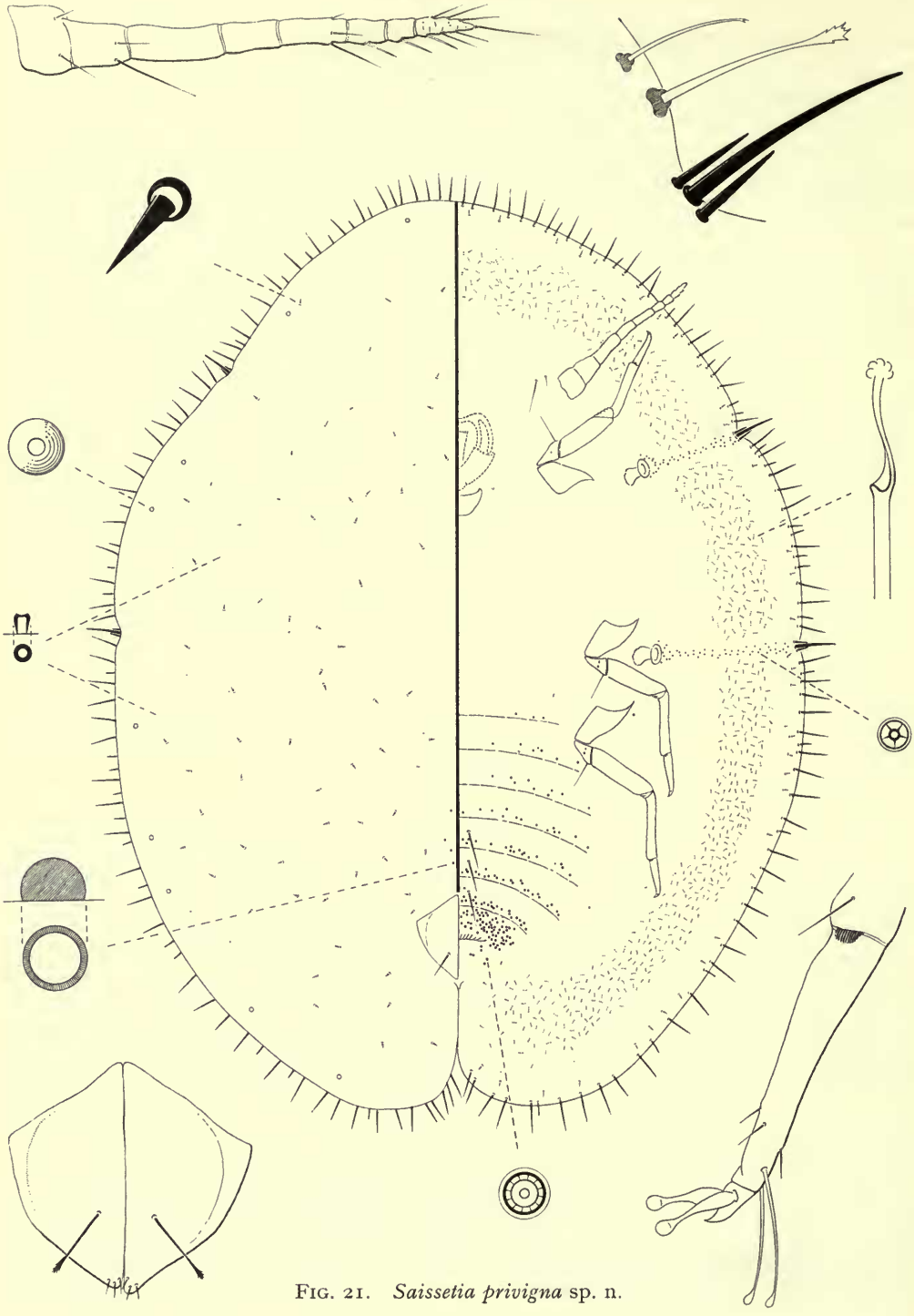

FIG. 21. *Saissetia privigna* sp. n.

Saissetia somereni (Newstead, 1910)

Lecanium mori somereni Newstead, 1910*a*: 187.
Lecanium (*Eulecanium*) *tremae* Newstead, 1911: 162.
Lecanium (*Eulecanium*) *tremae* Newstead; Newstead, 1911*a*: 93.
Lecanium (*Eulecanium*) *somereni* Newstead; Newstead, 1913: 76.
Lecanium somereni Newstead; Lindinger, 1913: 83.
Lecanium (*Eulecanium*) *somereni* Newstead; Newstead, 1917*b*: 130.
Saissetia somereni (Newstead); De Lotto, 1956: 247.

Records of *S. subpatelliformis* (Newstead, 1917) from Southern Rhodesia (Brain, 1920; Hall, 1935) are very likely referable to *S. somereni*. The two species are believed to be identical.

ETHIOPIA: Alemaya, 8.iv.1964, on *Ficus dekdekena* A. Rich. (Moraceae) (*B. G. Hill*).

KENYA: Nairobi, 23.iii.1955, on *Cordia holstii* Guerke (Boraginaceae) (*R. H. Le Pelley*).

SOUTH AFRICA: Transvaal, Zebediela, 5.ii.1957, on *Citrus* sp. (Rutaceae) (*G. De Lotto*). Rustenburg, 15.xii.1956, on *Citrus* sp. (*H. J. Smith*).

SOUTHERN RHODESIA: Que Que, 10.x.1963, on *Citrus* sp. (*C. J. Hodgson*).

TANGANYIKA: Arusha, 25.i.1961, on *Croton* sp. (Euphorbiaceae) (*G. De Lotto*).

UDINIA De Lotto, 1963

Udinia De Lotto, 1963: 194.

Type-species: *Udinia scitula* De Lotto, 1963.

To the six African species originally assigned to this genus, should be added *Lecanium* (*Saissetia*) *farquharsoni* Newstead, 1922, described from Southern Nigeria.

The following is a revised key for the separation of the species:

1		Paraopercular pores very numerous and arranged in a loose group extending on either side of the anal opercula	2
		Paraopercular pores few and set close to the median line of the body in front of the anal opercula only	6
2	(1)	Dorsal setae scattered; submarginal pores lacking	3
		Dorsal setae present only on the marginal area, where they are set in a continuous irregular fringe; submarginal pores present	***glabra***
3	(2)	Anal opercula each with two to five discal or subdiscal setae	4
		Anal opercula each with one discal seta only	5
4	(3)	Anal opercula each with two or three discal or subdiscal setae; setae of the marginal fringe between the anterior and posterior stigmatic clefts ranging from 17 to 25	***scitula***
		Anal opercula each with one discal and four subdiscal setae; margin of the body between the stigmatic clefts with 35–36 setae	***farquharsoni***
5	(3)	Setae of the marginal fringe long and finely pointed	***exoleta***
		Marginal setae short and variously frayed at the apex	***paupercula***
6	(1)	Legs with an articulatory sclerosis between tarsus and tibia; anal opercula each with one discal seta	***pterolobina***
		Legs without tibio-tarsal articulatory sclerosis; anal opercula without discal setae	***setigera***

Udinia farquharsoni (Newstead, 1922) comb. n.

(Text-fig. 22)

Lecanium (*Saissetia*) *farquharsoni* Newstead, 1922: 530.

According to Newstead (1922) the adult female is "hemispherical, or narrowly ovate and highly convex; margin very thick, forming a distinct rounded moulding or bead. Integument with a faintly matted surface when preserved in alcohol, due apparently to secretion of foreign matter, on the removal of which, by slight friction, the derm presents a polished appearance. Colour rich dark castaneous; immature examples dusky buff." The following redescription is based on a rather young adult female designated as "type" though the date of collection is not the same of that given by Newstead in his original description.

Outline of the body nearly circular; length 2·9 mm. Dorsal dermis with numerous pale areas which are fairly large and close together near the margin of the body, and tend to be smaller and rather widely apart from one another near the centre; each pale area encloses a minute pore. Dorsal setae conical, all attaining the same size and evenly distributed. Paraopercular pores hemispherical, set in a loose group of 66 in front and on either side of the anal opercula. Submarginal pores lacking. Anal opercula together pyriform, with a longish, robust discal seta, and four small, slender, subapical ones, most of which were broken away in the specimen examined; two or three minute setae occur on the apex. Length of each operculum 300μ; combined width 275μ. Setae of the marginal fringe of different sizes, variously frayed or pointed at the apex; the larger setae are 60–75μ long; the small ones 30–45μ. On the margin of the body between the anterior and posterior stigmatic clefts there are 13 large and 22 small setae in one side; 15 and 21 respectively on the opposite side. Stigmatic spines three; median 40–50μ long; laterals 25–30μ. Multilocular pores rather few around the genital opening only. Quinquelocular pores set in irregular bands one pore wide. Tubular ducts arranged in a continuous submarginal band on the ventral side of the body, as normal in the genus. Antennae with eight segments, measuring together 380μ. Legs well developed with a small tibio-tarsal articulatory sclerosis; ungual digitules of the same size and shape; dimensions of legs (iii): trochanter plus femur 210μ; tibia plus tarsus 220μ. Owing to large distortions of the ano-genital area the setae of the fold of the anal invagination could not be properly detected.

Southern Nigeria: Near Ibadan, 9.iii.1918, host plant not recorded. (*C. A. Farquharson*).

In Newstead's original description the date of collection is December 1917. According to an additive note by E. B. Poulton, the species was collected on *Imbricaria maxima* Poit. (Sapotaceae).

VINSONIA Signoret, 1872

Vinsonia Signoret, 1872: 33.

Type-species: *Coccus stellifer* Westwood, 1871=*Vinsonia pulchella* Signoret, 1872.

The genus *Vinsonia* was introduced by Signoret (1872) for the inclusion of a single species, *V. pulchella*, which name he later (Signoret, 1877) synonymized with *Coccus stellifer* Westwood, 1871. Even nowadays the recognition of this genus merely rests on the stellate pattern of the wax test or on the sclerotization of the cephalic lobe. Lindinger (1913) retained *Vinsonia* identical with *Ceroplastes* with which it actually shows a very close morphological affinity. In view of our extremely poor knowledge of the identity of several species currently assigned to *Ceroplastes*, any discussion on the validity and composition of the genus *Vinsonia* is premature.

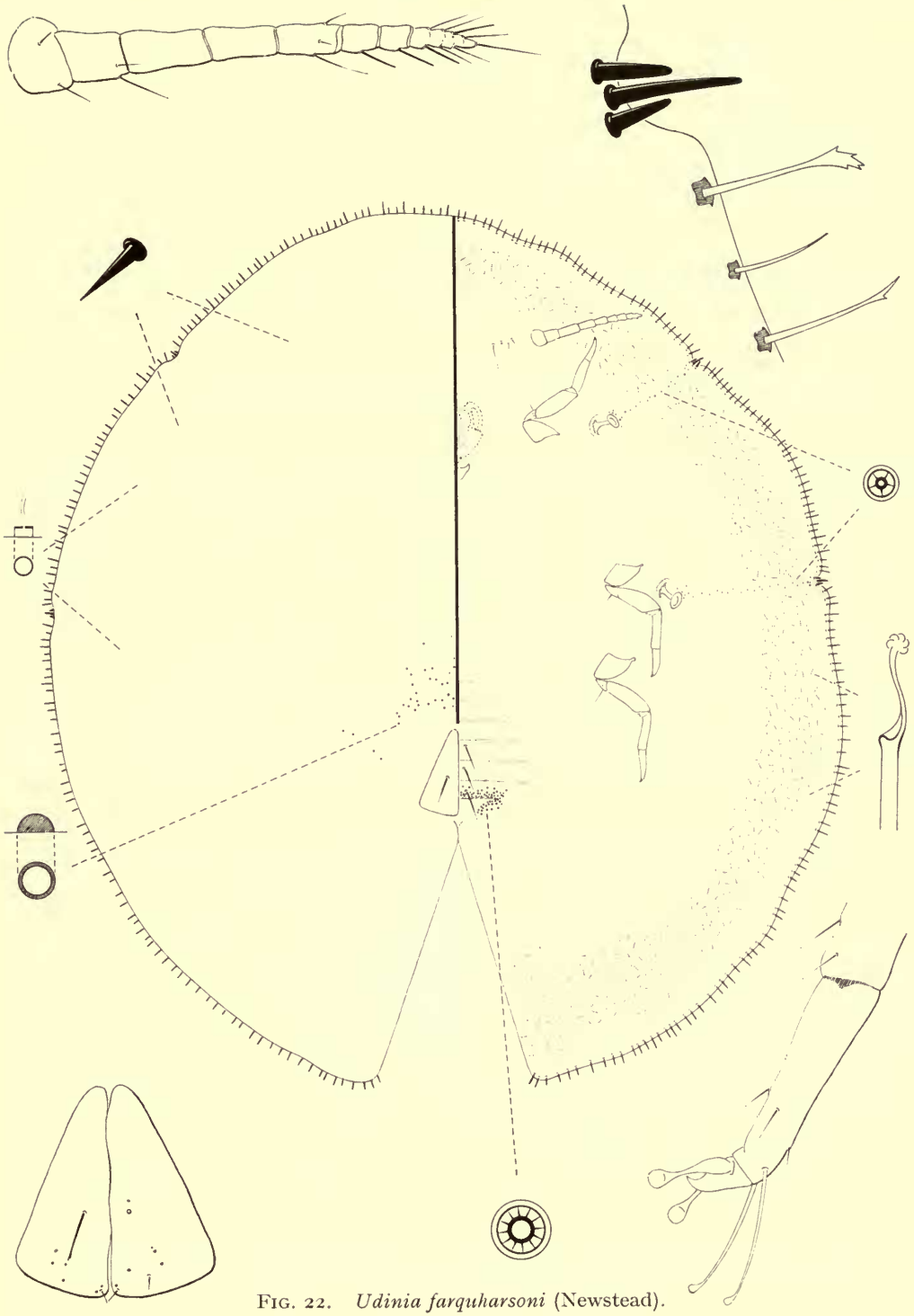

FIG. 22. *Udinia farquharsoni* (Newstead).

Vinsonia stellifera (Westwood, 1871)

(Text-fig. 23)

Ceroplastes stellifer (Westwood) Lindinger, 1913: 81.
Vinsonia stellifera Green [*sic*]; De Seabra & Vayssière, 1918: 163.
Vinsonia stellifera (Westwood); Laing, 1928: 215.

The first record of this species from Africa south of the Sahara was by Lindinger (1913) from Tanganyika on *Cocos nucifera* Linn. Later the insect was found on *Citrus* sp. in S. Thomé, a small island in the Gulf of Guinea (De Seabra & Vayssière, 1918; Laing, 1928).

The following detailed description of the external appearance of the living adult female is transcribed from Green's *The Coccidae of Ceylon* (1909).

"Adult female with a semitranslucent waxy test, the margins of which are flattened and produced into seven rays that give the insect the appearance of a miniature starfish. Median area strongly convex above, the apex with an oblong pad of opaque white wax. Colour of living examples pink darkening with age to purplish red. In dried examples this tint fades to reddish brown. Anal operculum dark brown. Margin colourless during life; yellowish in dried examples. Each ray is tipped by a longish conical process of opaque white wax. The median anterior ray carries a supplementary white point on each side of the terminal process. The following two rays on each side have a well-defined median ridge. A pair of small white waxy processes project from the posterior margin immediately behind the anal aperture. Under surface flat. After oviposition, the median area shrinks and forms a cavity for the reception of the eggs. From below, it can be seen that the median anterior ray corresponds with the cephalic lobe. The following two rays on each side are associated with the two pairs of stigmata, while the two remaining rays proceed from the abdominal lobes. At the extremity of each ray, below the base of the terminal process, is a fringe of minute glassy points—the remains of the earliest larval fringe. Diameter—across the rays—3·50 to 4·50 mm."

Young mounted adult females very broadly oval in outline; 1·2–1·4 mm. long. Dorsal setae minute, spiniform; very few. Dorsal pores of the simple type with two circular loculi of different diameter. Setae and pores are scattered without any pattern, except on a median, a cephalic and three lateral rounded or oval areas, where they are entirely lacking. Caudal process very short and very stout, strongly sclerotized. Anal opercula each with one discal, one subdiscal and one apical setae, all longish and robust; length of the opercula 85–95μ; combined width 55–65μ. Stigmatic spines set in groups of 4 to 8; all are stoutly conical, but variable in length; straight or slightly curved; the largest spine seen was 40μ long. Tubular ducts entirely absent. Multilocular pores few around the genital opening only. Quinquelocular pores few and arranged in bands two pores wide. Cruciform pores few. Legs very small, all having the tarsus and tibia fused together; ungual digitules not differentiated in shape and size; dimensions of legs (iii): trochanter plus femur 65–75μ; tibia-tarsus 58–75μ. Antennae short and rather stout, with six segments; total length 140–160μ. Between the antennae are inserted 14 to 20 long robust setae. Two to four setae of variable length occur at the posterior end of the body.

KENYA: Mombasa, 5.ii.1963, on *Mangifera indica* Linn. (Anacardiaceae) (*G. De Lotto*).

ZANZIBAR: 10.ii.1956, on *Cocos nucifera* Linn. (Palmae) (*R. H. Le Pelley*).

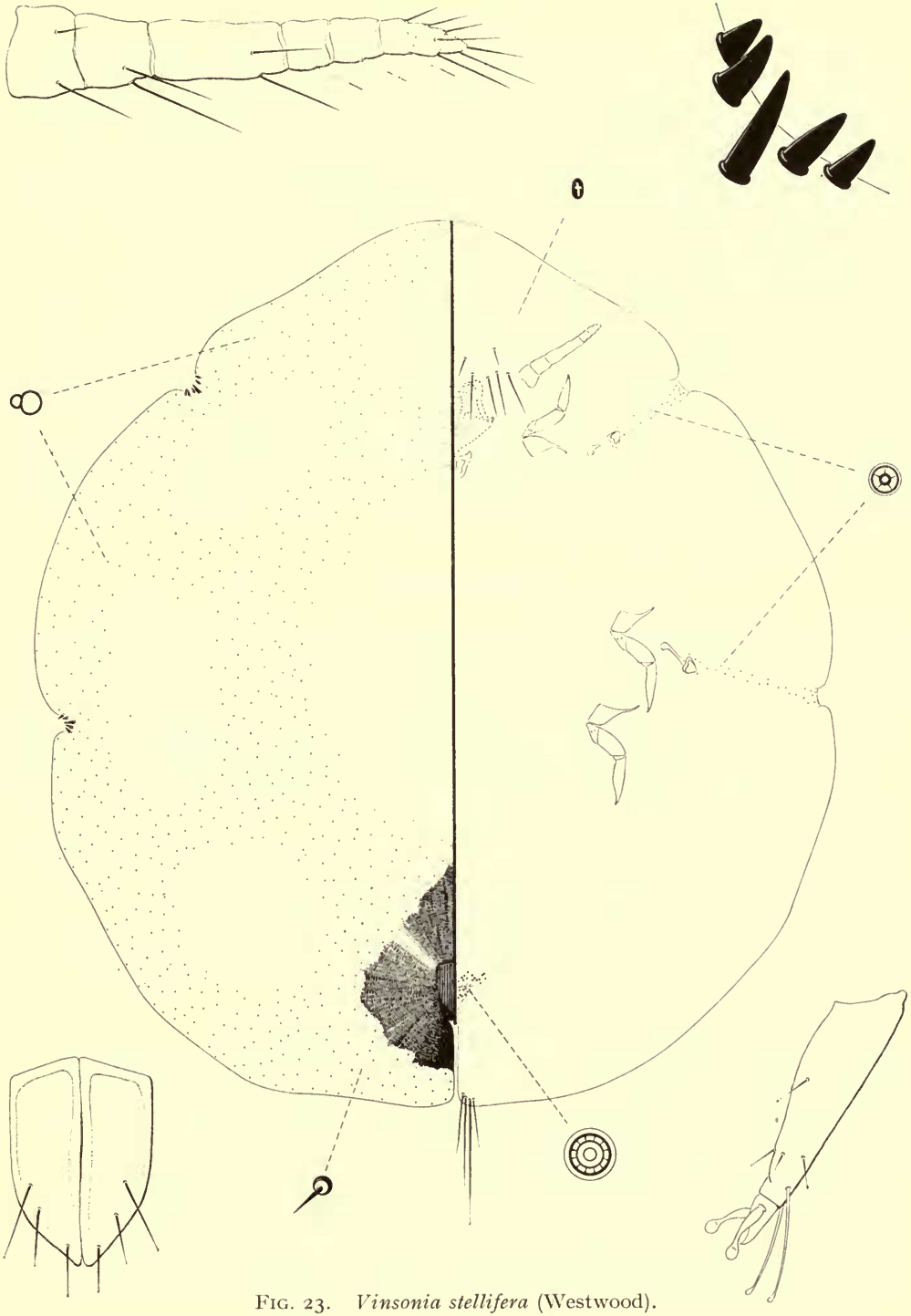

FIG. 23. *Vinsonia stellifera* (Westwood).

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